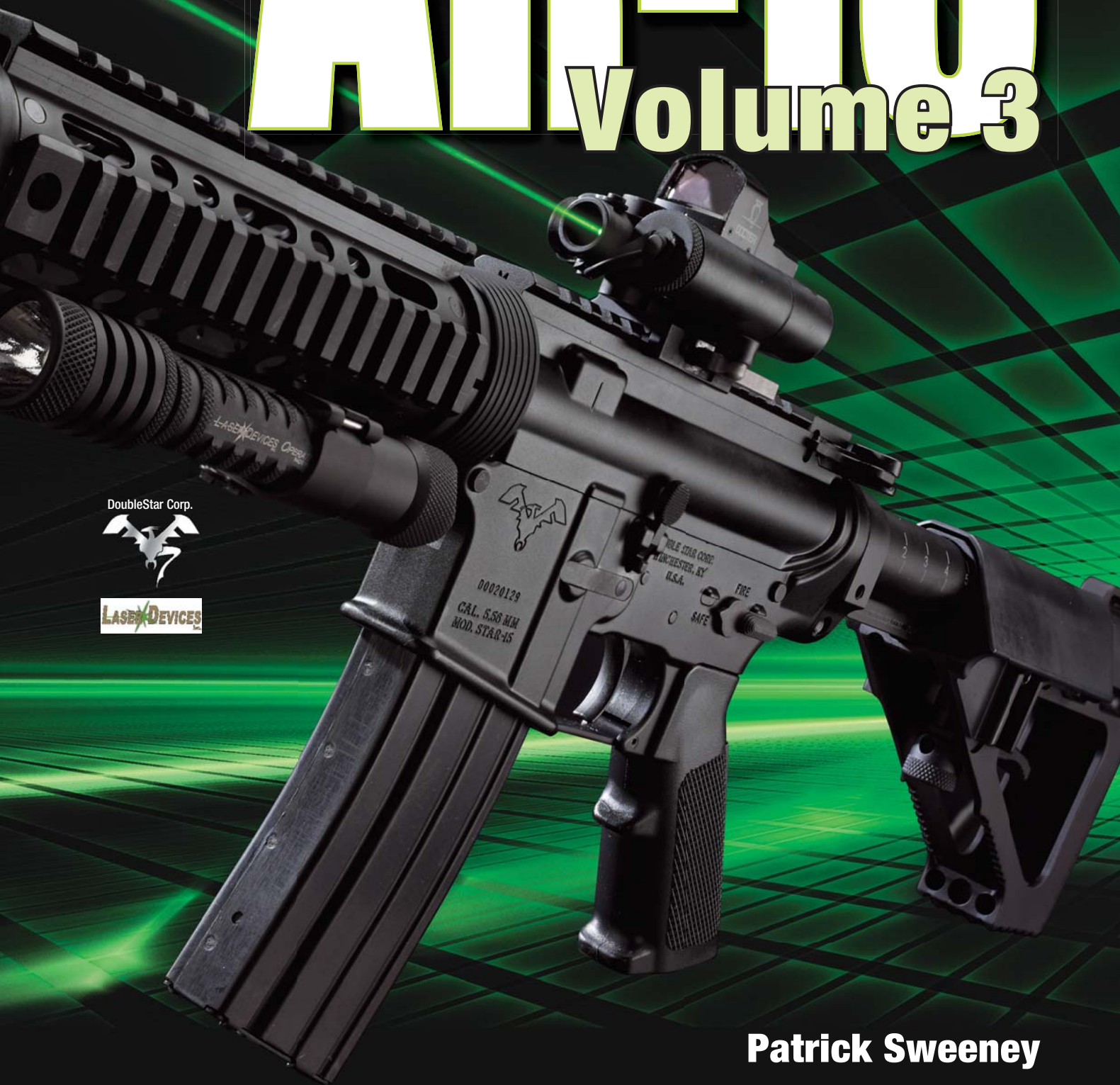


Gun Digest®
Book of
THE

AR-15

Volume 3



DoubleStar Corp.



LASER DEVICES

Patrick Sweeney

All the Latest in Guns, Optics and Accessories

Gun Digest®
Book of
THE AR-15
Volume 3



PATRICK SWEENEY

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Published by



Gun Digest® Books, an imprint of F+W Media, Inc.
Krause Publications • 700 East State Street • Iola, WI 54990-0001
715-445-2214 • 888-457-2873
www.krausebooks.com

To order books or other products call toll-free 1-800-258-0929
or visit us online at www.krausebooks.com, www.gundigeststore.com
or www.Shop.Collect.com

Library of Congress Control Number: 2010924666

ISBN-13: 978-1-4402-1376-2
ISBN-10: 1-4402-1376-3

Cover Design by Tom Nelsen
Designed by Paul Birling
Edited by Dan Shideler

Printed in United States of America

DEDICATION

As always, and ever, for Felicia.



ACKNOWLEDGEMENTS

As the story goes, Winston Churchill was broke. He'd been essentially tossed out of the government, and the great depression was raging. So he wrote. He wrote a biography of an ancestor, John Churchill, the 1st Earl of Marlborough, but his crowning achievement was his *History of the English Speaking Peoples*. It was not published until after WWII, but that wasn't a problem as he was also a well-paid lecturer and public speaker. The manuscript of *History of the English Speaking Peoples* was typed by a secretary as he dictated it. That's right, he wrote a multi-volume book out of his head. I'm sure he did research from the family library, as any decent landed gentry house of the time no doubt had books contemporaneous to the period he was speaking on. But, holy cow, to do it all off the cuff, as it were. What a guy!

I did not dictate this book. I typed it, and I had help from the people who make the stuff you're reading about. Dave Beatty, as always, was quite helpful on matters related to billet machining and Sun Devil. Todd Tuttle at PWS was more than helpful, and I still get a chuckle when I look at their poster of the tactical Corgi. To Mark Malkowski: if not for you and Stag, I'd be depending on my own crude drawings to convey what it is to manufacture an AR.

Eric Kincel of Vltor and Adam Treischman of Spirit spent more time than could easily afford going over the gear they make and how they make it. And Les Baer not only makes good guns, he is more than helpful in explaining what goes into them.

Ammo, ammo. Wolf provided plenty, Black Hills even more; Alexander Arms sent a metric vestload, and Hornady continues to amaze and embarrass me on the amount of ammo they are willing to send.

On the new piston front, Jason Adams sent his system, info, instructions and more. Jeff Overstreet of CMMG allowed me to spend entirely too much time dissecting his piston system and then thrashing it on his range with all the ammo I cared to feed it. Now that is confidence in a system.

As for Rock River: thank you. An Operator Elite, a stock M4gery and a 9mm lower, all to inform the readers and extol the virtues of Rock River firearms. You are the soul of generosity.

Frank DeSomma, my apologies for taking this long to review your rifles. It was worth the wait; they are bomb-proof and run like tops.

Last, Colt. I know, as I've said many a time, it is fashionable to bash Colt. But they still make the gold standard of DI-driven carbines and rifles. They managed to find one to send me, and they also allowed me to wander the factory, poking my nose into things probably best left unpoked.

To all, my very sincere thanks.

Patrick Sweeney
April, 2010

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INTRODUCTION



The AR-15 is still with us. When I was first reading about firearms, the AR-15/M16 was brand-new, vilified, and “soon to be replaced with something better.”

Well, that “something better” hasn’t arrived just yet.

In the field of mechanical engineering, there is a concept called “mature design,” that is, something that has been around so long that everyone knows it and knows what to expect from it, and which cannot be improved, only replaced. Now, the idea only works as long as you maintain the same framework. An example: the Roman *gladius*. A short sword, sort of like a machete sharpened on both edges, the gladius was the tool of Roman conquest

and order. With a blade two feet long at most, it wasn't an imposing weapon. Unless, of course, it was being wielded by one in a cohort of legionaries who were closing in on your formation. The gladius was meant as a team weapon. The cohort (the single line in each century) were behind their shields, and each legionary was trained to support the guy next to him. You weren't going to fight one, you were going to fight them all.

As good as the gladius was, if the locals (think: big German tribesmen) broke the line, then each legionary was at a disadvantage one-on-one. Unless, of course, he remembered the training he'd been given on using his shield as part of his fighting.

However, put a Roman legionary up against a foppish French courtier, and the Roman was toast as soon as the pomaded frenchie figures out how to get his light, fast, pointy stabbing blade past the tired Roman's shield.

The lesson has to be learned again and again. When smokeless powder-using, magazine-fed rifles were new, the idea of a rifle company commanding all it saw before it out to 1,000 yards was very appealing. A couple of decades later, in the trenches of WWI, a rifle with a 29-inch barrel and a 16-inch bayonet was not very handy, and the ability to hit targets at 900+ yards was next to useless. What you needed on a trench raid was a good pistol, a shotgun, and an entrenching tool with one side of the blade sharpened. And a bag of grenades.

In the history of small arms, some have lasted longer than others. In the American arsenal, the AR-15/M16 has lasted a long time. Depending on just when you think it was introduced, adopted, accepted or issued, it has passed its 40th birthday. It's closing in on 45 years. The M1 Garand lasted from 1936 to 1958. The M1 Carbine from 1940 to 1958. The 1911 pistol, 1911 to 1985. One that is overlooked by many is the Colt/Browning 1917 machine gun, from 1917 to 1960. The winna and still champeen in American service, however, is the M2HB. From 1921 to the present day, the big .50 has been smacking America's enemies and smacking them hard, at a pace so sedate it can only make the blood run cold on the other end.

The much-beloved-by-some M14? A paltry 1958 to 1968. Oh, some are still in service, but only because the government still has them. There are few spare parts, no trained armorers, and the only ones who love it do so because they love the cartridge more than anything. 40-45, 22, 18, 74, 90, 10 years? All pale in comparison

to the current record-holder: the British Brown Bess musket. Introduced in 1722 as the Land Pattern musket, it served essentially unchanged until replaced in 1838 by a percussion-cap model of pretty much the same rifle.

If we take things up to the point where the British adopted a rifled musket in the Enfield Pattern 1851 rifled musket, that means the Brown Bess, or a derivative of it, served for 129 years. That's a lot to ask, but the M2HB will match it in the year 2050.

What does all this have to do with the AR-15? Simple: it does not appear likely to be replaced any time soon.

As much as some love to hate it, nothing seems ready to push it off the platform just yet. What everyone seems intent on is tuning it up, improving performance, basically fiddling around the margins – which is what we'll be looking at in this volume. In earlier volumes we covered the various makers. In the AR-15 Gunsmithing volume we've looked at how to work on the rifle, and what things you can and cannot change. Here, we'll be looking at three main fields, and the things that relate: the piston system, different calibers, and aiming options.

Cast your mind 'way back to the 1980s: the bad hair, the dodgy music, the cars that (in many cases) sucked. At the same time, the Army was looking to do two things: improve the M16 and replace it. The replacement was the SPIW, a combination weapon that the user could choose to fire either flechettes (small, dart-like projectiles) at hyper velocities, or grenades. Yes, both from the same weapon.

Neither worked on its own; the two together worked even less well (one sample produced for the testing was inspected and deemed too unsafe even to test-fire) and the improved M16 became the new rifle. One big change was better sights, for more-accurate long-range shooting. Which was ironic, as by then the Army had given up on precise long-range shooting with rifles, but that is a story to be covered in the appropriate chapter.

We'll be looking at pistons because that is the big drawback of the AR-15: the direct impingement gas system. But it's its greatest strength, too. Yes, that is a schizophrenic statement, but that pretty much describes the whole AR-15/M16/M4 mess: yes/no, good/bad, I love you/I hate you, etc.

Oh, and prepare to leave your preconceived notions at the door, as there are a lot of things you "know" about the AR that you really don't. No offense intended.

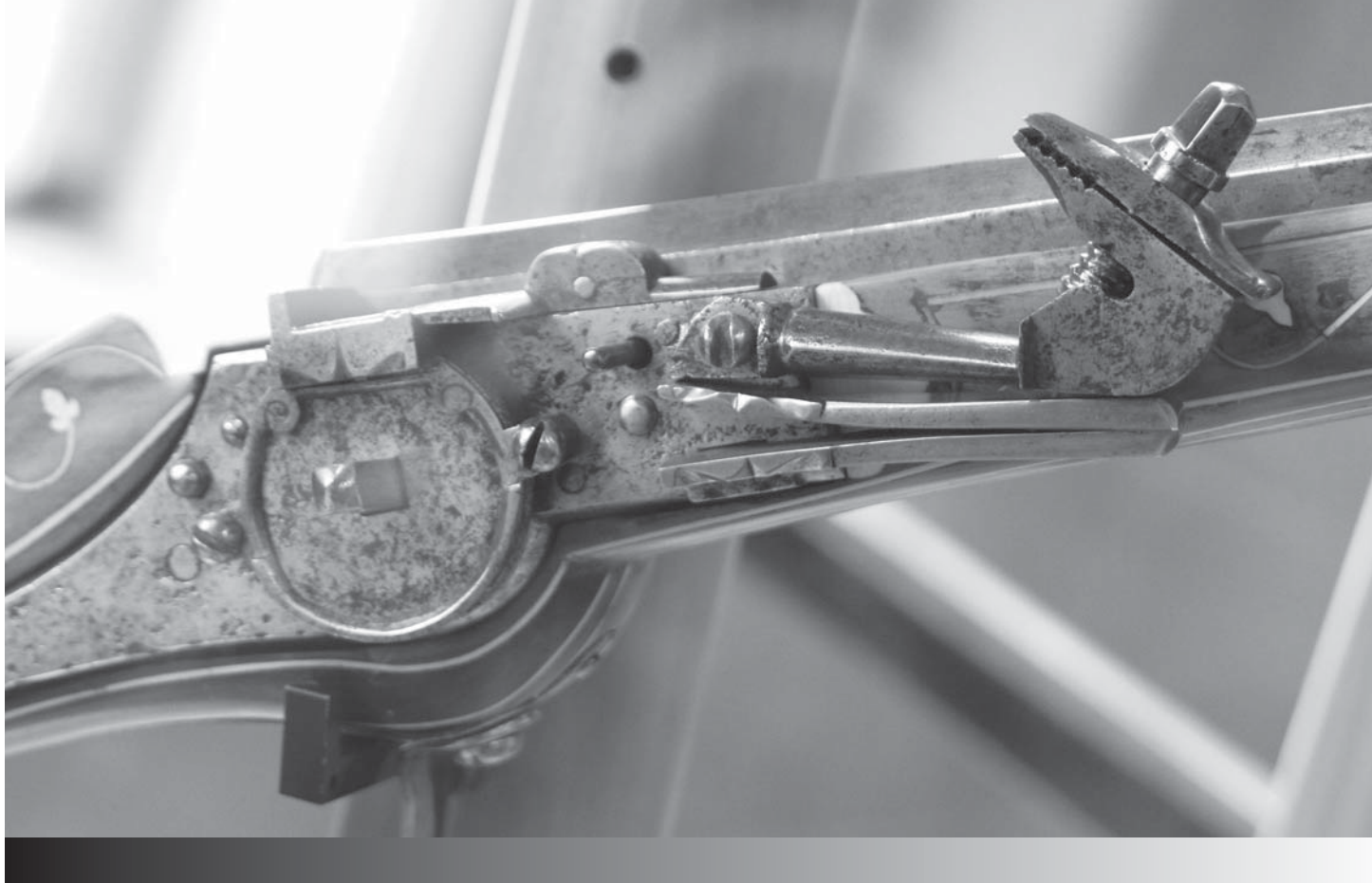
Read on.

CHAPTER 1

WHAT ARE WE DOING HERE?



Rifle classes are popping up all over.
There's an empty spot waiting for you.



A wheellock, the highest-tech firearm of the first half of the sixteenth century.

OK, granted, the AR universe is in flux. Companies are popping up right and left (and dying in the sun, in many cases) and the plethora of painted ARs to be seen on the range is like never before. So what? Wasn't it always like this? And what's so special about now?

Simple: the AR has finally become the ultimate home hobby gun. You can build an AR in any configuration from an entry gun, with a 10.5-inch barrel in 5.56 (with appropriate paperwork, of course) to a twenty-inch barreled sniper rifle in 6.5. You can have iron sights, or a scope; you can have a stock that adjusts or doesn't; and you can have a trigger that is breath-light or pliers-heavy.

All this beginning on the same upper and lower, without even having to get a special model to handle something out of the ordinary. Unless you're going to a

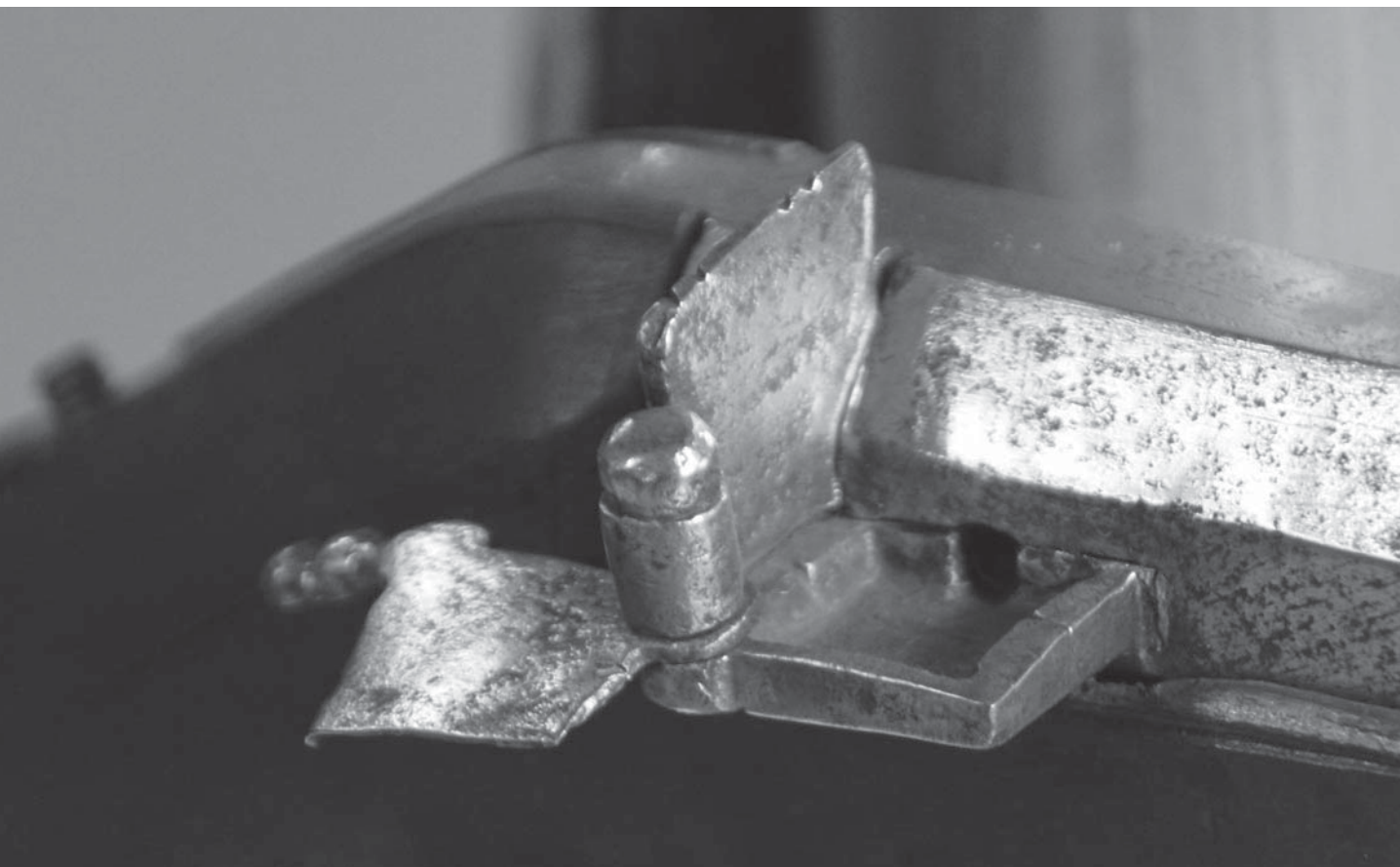
cartridge that doesn't fit the magazine platform, you can do it all starting with the same basic upper and lower.

You can also swap from the original direct gas impingement system to a piston system, and back. (Well, some piston systems would make switching back a bit tough, but that is a small detail.)

No other rifle in history has been able to do this. The Mauser came close, being able to be chambered in a whole host of cartridges, but to do any of the work you had to be a gunsmith. Not so with the AR-15.

And yes, I'm going to call it the AR-15, unless a specific rifle we're discussing or thrashing has a different name on it. We're going to dive deep into the AR in the 21st century.

That means looking at all the calibers you can get (or at least, that I can lay hands on) and wrestle into



A matchlock with a cover for the pan. A real techno-advance prior to 1500 AD.

the standard AR. We'll be looking at the pistol calibers and rimfires as well. We'll look at triggers. The original trigger was meant to be durable, GI-proof and good enough to shoot people at close range while not failing or breaking. In that, it is pretty good. If you're willing to do a little swapping and tuning, it is good enough to shoot things out to as far as your skill allows. I repeat: as far as your skill allows, which may exceed the ballistic oomph of the cartridge you are using.

We'll look at the scopes you can use, and other seemingly minor details such as flash hiders and/or muzzle brakes. (And for god's sake, it is muzzle *brake*, not *break*. You're *braking* the felt recoil of the rifle, puttin' on the brakes, not *breaking* the muzzle of your rifle. If you break (or ding, dent, mar, wear or alter) the muzzle, you suddenly have a much less-accurate rifle.)

Along the way we'll also delve deeply into the whole DI (direct impingement) vs. piston controversy, where I explain it all for you and then in my own fashion do not

tell you what to do. Hey, it's a free country, and you will all make your own decisions regardless of my opinions. I'm just here to inform.

Also, I'll be skirting close to the borders of known AR space, giving you the lowdown on the rifles that bear a tenuous relationship to the AR, but in some minds are viewed as competitive marketplace options.

What we won't be doing is looking at the big bores, the .308 rifles and the cases that are close to or derived from it. That is for another volume, and I'll be working on that one as soon as I finish this one.

This book will be less a compilation of the makers and options gear producers of ARs, than a look at the system itself, and how things work and relate. Oh, don't put this book down (you're skimming it at a bookstore, right? Buy the book, and save yourself the agony.) Think of it as your graduate program in AR-ology. And unlike most graduate programs, you won't be doing the work the professor or Ph.D. should be doing and teaching the

7:00 a.m. calculus classes that your lowly seniority has consigned you to. You'll be having fun. After all, the AR is fun, and there is no point in denying it.

When firearms came onto the scene in Europe, they were at first just noisemakers. As the art of gunnery improved, they became more and more useful. The history books I was exposed to (back when an education included recess, gym class, and a whole lot of other "obsolete" sessions) basically concluded that firearms ended the age of knights, due to the greatly decreased need for training and valor. Oh, how I wish I could set those historians correct today. Firearms didn't decrease the need for training or courage, they simply called for it in different ways. Let's look at just how you'd go using a matchlock, one of the earliest infantry firearms:

A matchlock uses a length of hemp cord, soaked in potassium nitrate and dried. The cord burns slowly, (a foot and hour or so) but hot enough to ignite black powder. So, with your "slow match" burning, you dump powder down the muzzle of your firelock. Tamp a wad over it. Drop a ball in and stick a wad over it. (If you don't, the ball won't stay in place. The fit was that loose.) All the while, you're keeping the powder away from

your slow match. Put the firelock on the forked rest, and dump a small amount of finer-grained powder in your pan. Some designs had a hinged cover on the pan, to protect it from rain, wind or errant slow matches.

Remember, you're doing this while the enemy is shooting at you with arrows and other firearms, the cavalry is looking for a time to ride you down, and your pikemen are trying to keep the cavalry at bay. In other words, during utter chaos.

Now, look up and pick a target. Blow on your slow match, to be sure it is hot enough, thumb your pan cover open, and press the lever (this was too early in the design process to call it a "trigger") to bring the slow match down to the pan. *Flash! Boom!* You've fired your shot. Now, swab the bore relatively clean (depending on how many shots you've already fired) and start over. If you have the dexterity of a manic juggler, you can manage a shot a minute. Unless, of course, your Captain is trying to keep everyone ready to fire for a couple of minutes, until he could command a massed volley to keep those pesky cavalry troopers honest.

The first battle clearly decided by firearms, the Battle of Marignano, went down in 1515, outside of Milan,



Belt and suspenders? How about a snaphaunce with a matchlock as backup? This puppy was not going to let down its owner at the end of the fifteenth century.



And for the ultimate back-up if things go wrong: a sword with a pistol in it. Or a pistol with a sword on it. It's all in your perspective.

and it involved French artillery plowing bloody furrows through the massed Swiss pikemen. The Swiss thought that valor and a charge home with cold steel could drive the French off the field and leave them the loot to carry home. They were perhaps the first to learn the wrongness of that attitude, but not the last. By the time of the Battle of Pavia, ten years later, no army would think of going into battle without artillery, arquebusiers (those guys with matchlocks) and cavalry as support, not main arms. Managing a firearm back then was hazardous in the extreme.

Doing all the detailed items required to run any kind of firearm back then, in the midst of a battle, took courage. And to make it better requires cleverness, money and a gunsmith who understands you. Firearms went from the matchlock to the snaphaunce and

miquelet, designs that were more complicated and less reliable than the later, perfected flintlock. Along the way, the landed gentry bought the wheellock. The wheellock uses a spring-loaded wheel and a flint, yes, exactly like the striker in a Zippo cigarette lighter. When I was visiting a museum in the palace of the Gonzagas, in Mantua, Italy, I happened upon a musket that was obviously built by a “belt and suspenders” kind of guy: a snaphaunce with a matchlock backup on it. If the snaphaunce failed (they were fragile, expensive and generally made for cavalry) the shooter could use the slow match already on his musket.

And you think you've invented something new, with backups for this or that? Improvements that are cutting-edge, unthought of by others? Not really, and probably not since the invention of bronze armor. No, improving



The arquebusier, using a matchlock. A shot a minute was rapid fire, and while you were loading you were not doing anything else.



Yes, I was “on” the day I shot this, but a one-inch group at 100 yards, with iron sights from an AR, was impossible twenty years ago.

the system is not something you, we or the guy next to you have recently invented. In fact, the systems we're discussing in this book aren't even new.

While the direct-gas impingement system is generally known to be made and issued in the 1940s, with the Ljungman rifle, the French were experimenting with that method of operation two decades earlier. They just didn't get around to perfecting it, or issuing it in numbers enough to see if it needed perfecting. The piston-driven system is older. John Moses Browning designed the 1895 Colt machine gun. It used a flapper, said part being blown open by gases, and the pivot of it working the action. When it came time for the US to enter WWI, a flapper-actuated machine gun was clearly not useful in tanks. So, Marlin redesigned it to use an inline piston. Browning himself did the same, when he designed the legendary BAR.

So, the "DI vs. piston" struggle predates both the AR-15, and the AK-47, which are merely the modern incarnations of the two designs.

What the AR is, is the modern working man's symbol of democracy. George Orwell wrote, in January 1941: "That rifle hanging on the wall of the working-class flat or labourer's cottage, is the symbol of democracy. It is our job to see that it stays there." The AR-15, on the cusp of becoming the modern sporting rifle, is also the very kind of rifle that George spoke of.

The AR is the first modular rifle. And it became such not because of government design bureaus or the genius of committees but because of the desires of the gun-buying public. It is due to you, the AR shooter and reader, that the rifle is as refined as it is – so refined and so well-built today that Brownells can actually have a place for it on their web page. With the Brownell's AR

Builder, you pick and choose the items, options and brands you want. The software shows you how it will look, and totals it up for you. Once you're happy, hit "send" and it will be yours. Well, at least, the parts will be. But that is the beauty of the AR: once the parts arrive, it is not that big a deal to put them all together. That simply isn't possible with other firearms, at least not to the extent and ease that the AR possesses.

The AR is a lot of other things, too. It is the most accurate rifle ever to grace the ranges of NRA High Power. (Don't believe me? Check the scores and match results.) It is the most reliable self-loading rifle ever made. "Comrade! Is not true! My AK is more reliable." I will grudgingly give way there, but only in limited circumstances. If you're going to treat a rifle as a neglected tool, like the rusty crescent wrench in your toolbox; never oil it, never clean it, never give it a moment's care or consideration, then yes, an AK is more reliable than an AR. And a length of steel pipe is more reliable than an AK.

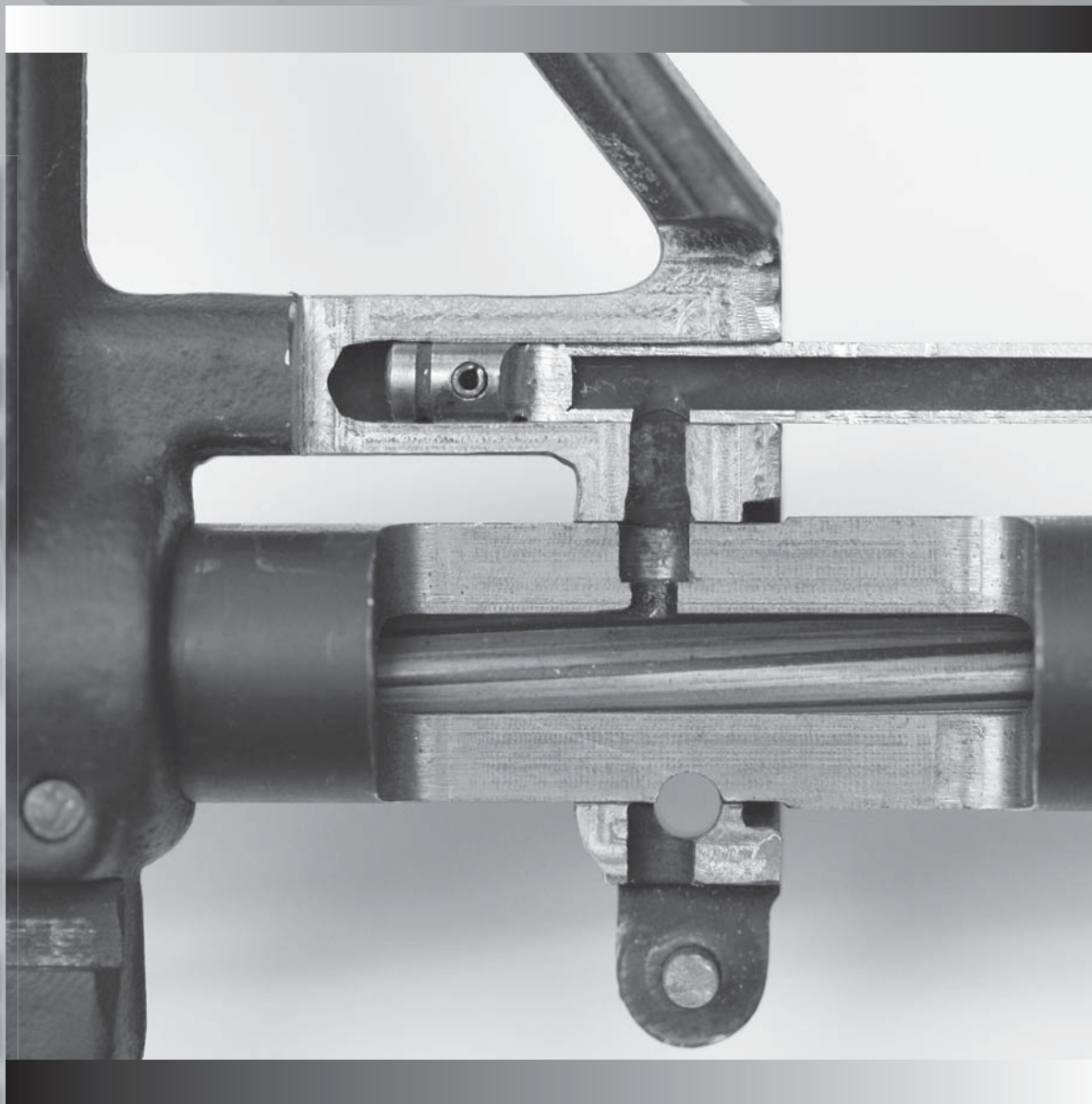
I'm not a third-world troglodyte, incapable of maintaining an essential life-saving tool. I know what lubricating oil and cleaning patches are for, and I use them. Maintained, the AR is the most reliable self-loading rifle ever made.

If you still don't believe me, then fine. Have it your way. And while you're using your "more reliable" AK in a match, I'll be crushing your scores with my AR. And yes, Virginia, I've seen AKs malfunction.

What are we doing here? We're having more fun than the law in some states allows. We're reveling in the info, fun, and entertainment the AR allows. And we're expanding our knowledge and hopefully skills base as we do it. But most of all, we're having fun.

CHAPTER 2

WHAT IS THIS PISTON STUFF, ANYWAY?



The direct gas impingement system vents gas out of the barrel and back to the receiver, with no intermediate parts.



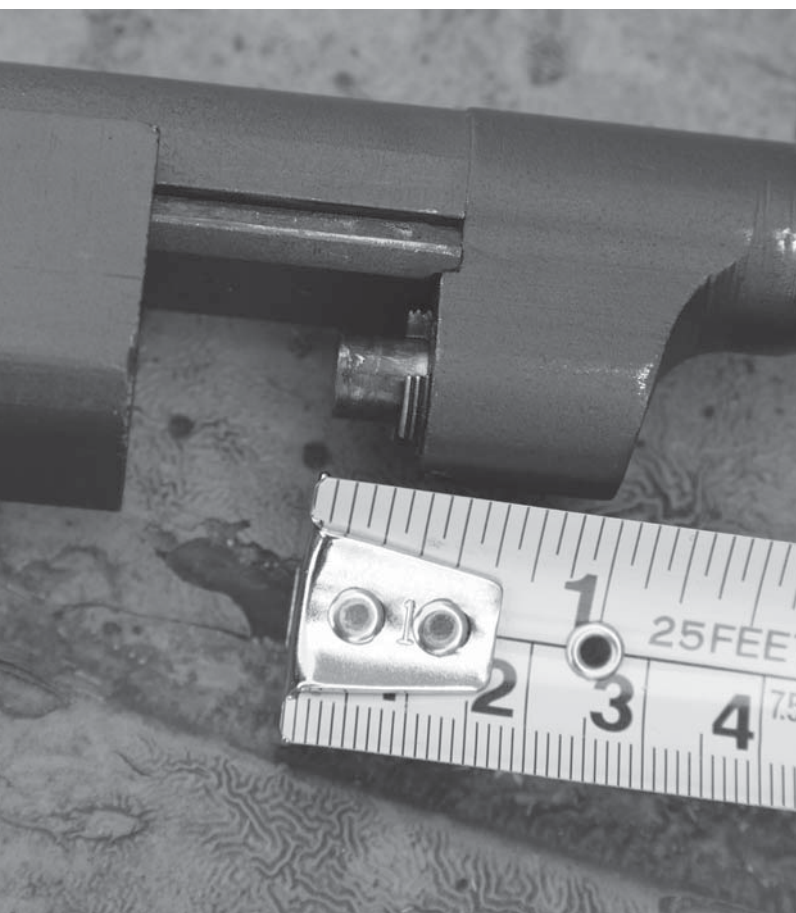
The M1 Carbine is a short-stroke piston design.

Before we can discuss the piston systems available, you have to have some background. And before we can discuss the piston systems with any chance of clarity and common understanding, you have to know a lot more than the average AR owner or GI knows about the Stoner system. The AR was designed around a system known as “direct gas impingement.” The barrel has a gas port under the front sight. When you fire a round, the gases pushing the bullet get sluiced off (a small amount, anyway) and travel back to the receiver through that shiny, hollow tube called the gas tube. There, they pressurize the interior of the carrier (the big steel cylinder that the bolt rides in) and blows it back off the

bolt. The bolt, constrained by the cam pin, rotates and then follows the carrier back.

The bolt and carrier travel back, compressing the action spring, which when it has fully absorbed the work, pushes the parts back towards the muzzle. The bolt strips a round off the magazine (unless the magazine is empty or faulty) and chambers it, closing and locking.

Obviously, the pressurized gases, when they vent out of the carrier, splatter hot gas and powder residue into your lovingly cleaned receiver interior. That is the origin of the phrase “pukes where it eats.” (I’ve heard other, more colorful terms used, but my Editor won’t let me use them. Not that I would, for a guy who has spent a



The M1 Carbine piston snaps back and forth maybe a quarter of an inch. That's all it needs to do to drive the system.

lifetime learning very hazardous skills, I'm remarkably restrained in using expletives.) Even a little bit of shooting will produce an AR remarkably slathered in carbon residue from the combustion of gunpowder.

What the critics will tell you is that the residues are bad. Yes, but not the life-shortening, hair-losing, interest rate inflating bad. Just grubby. With proper lubricant, you can reliably shoot an AR (as long as you scrub the chamber now and then) that is so filthy that chunks of carbon fly out when you shoot it. Bad for the left-handed shooters, but still reliable.

You'll also hear about the high-pressure gases that the system spews. Well, yes and no. The gas port pressure of the AR differs depending on the barrel length and the load used, but the typical 20-inch AR with M-193 ammo will have a port pressure of some 12-14,000 PSI. The carbine will have a port pressure of 18-20,000

PSI. However, by the time the gases have gotten back to the receiver, they have been reduced in pressure by an order of magnitude. (A quick math update for those who have been distracted by advertising fluff and language. An "order of magnitude" means you add or drop a zero. 100 becomes 10 or 1,000. If someone tells you their comp "reduces recoil by an order of magnitude," move on – they either don't know what they are talking about, or they are blowing smoke.)

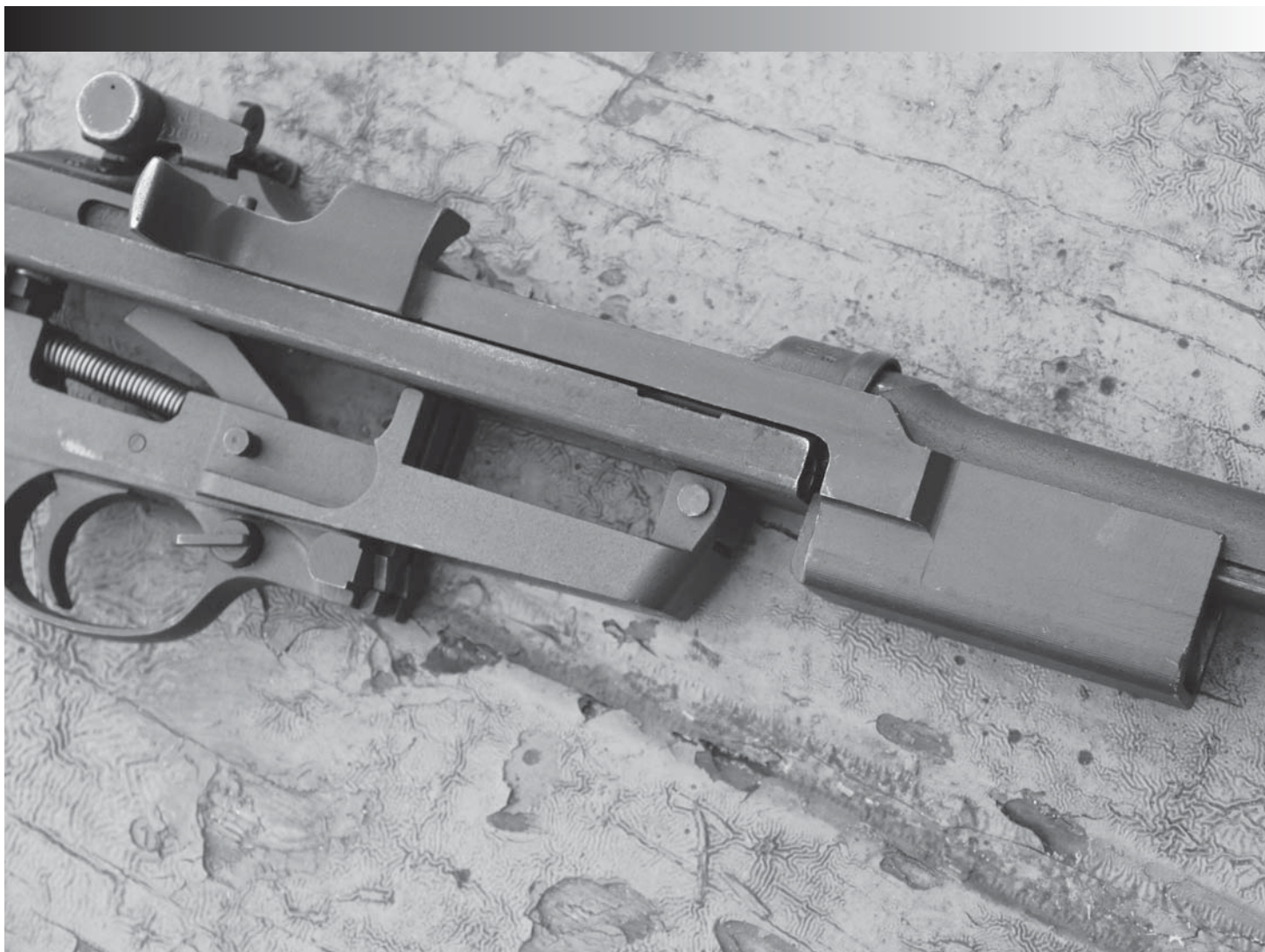
But I digress. The pressure drops from the 12K/20K at the gas port to 1.2K/2.0K in the carrier. Now, 2,000 PSI is not nothing. But a fully-charged SCUBA bottle runs more than that. So you aren't exposing your carrier and bolt to the open flame of a propane torch on every shot. You're just splattering it with grubby, hot gases.

Enter the piston system. The idea is not new: you shift the gas splatter to some other location, so it doesn't get squirted into your receiver. OK, before we can go on, you need a bunch more background.

Gas systems come in two flavors, with each of them having two variants. The flavors are long-stroke and short-stroke, and the variants are vented and non-vented. (There is another, throttled short-stroke, that we'll get to in a bit.)

Now, this is not to be confused with the long and short-stroke recoil systems. The classic long-stroke recoil system is the Browning Auto-5 shotgun. A 12 gauge (originally 12, it later came in others) shotgun, the system works by having the bolt and barrel locked together when fired, and both recoil simultaneously, locked together, for the full stroke of the system. When it reaches the rear of the receiver, the bolt latches in place, unlocks from the barrel, and the barrel runs forward, driven by its own spring. When the barrel gets forward, it releases a shell from the magazine, which when it feeds out unlatches the bolt, which gobbles up the shell, chambers it and locks to the barrel.

The short-recoil system is exemplified by a number of machine guns from the late 19th and early 20th century.



The piston launches the carbine op rod, which turns and cycles the bolt, returns and chambers and locks. All very simple.

In the short-recoil system, the barrel and bolt recoil for a short distance (typically less than the length of a cartridge) then the bolt unlocks and the barrel stops, and the bolt continues onward, as the system then extracts, ejects, feeds, chambers and locks closed.

Why all this folderol? Simple: corrosive primers. Any gas-operated system had to deal with the corrosive primer problem, and once you added the extra parts so a system wasn't exposed to the powder residue except in the bore, the result was a design too heavy for use as a personal weapon, until John Moses Browning designed the BAR. (The light machine gun, not the hunting rifle.) It, however, had to be cleaned after firing, as the piston

was exposed to the primer residue and could rust.

In the long and short recoil system in gas operation, the difference is not how far the bolt and barrel move, because the barrel doesn't move. The difference is simple: is the part actuated by the gas flow permanently attached to the bolt group?

The classic long-stroke piston system is the M1 Garand. The gas port delivers gas to the operating rod, which is a single piece long enough to reach back to the bolt. The gases thus work directly on the rod, which has a cam track that turns the bolt and cycles it back and forth. Alas, the simplicity of the Garand is not without drawbacks. The long rod is unsupported for nearly its



The M1 Garand is a long-stroke piston system. The gas works on the muzzle end of the op rod, which works the bolt. No parts in between.

entire length. I'm sure John Garand spent many a day trying to figure a way to support the rod and still make it easily disassembled by the soldiers it was issued to, so they could clean it after firing corrosively-primed ammo. That he could not and made the rifle work anyway is a testament to his genius.

The long-stroke piston system that you may be familiar with in another application is the AK-47 (and the AK-74). The system is highly reminiscent of the M1 Garand, with the op rod and piston mounted on the top instead of on the bottom of the rifle. Did Kalashnikov "steal" it from Garand? Good question. While there were probably not a lot of Garands that made it to Russia, the method was not unknown outside of the US. The genius of Garand wasn't that he conceived the long-stroke system, but that he made it work with the .30-06, perhaps the second most unsuited self-loading rifle cartridge in existence. (The Russian 7.62X54R takes that honor.)

The classic short-stroke piston system, also called the

"tappet" system, is the M1 Carbine: there, a small piston rests in the lug under the barrel. When the carbine is fired, the piston slaps the front end of the operating rod, which hurls back. The piston, however, is trapped in the barrel lug, and after traveling a fraction of an inch, it stops and gets pushed back in place when the operating rod moves forward as it closes the bolt.

Another short-stroke piston system from the classic era is the M14/M-1A. The piston rides in the piston housing under the barrel, and when you fire a round the piston pushes on the operating rod. Like the M1 carbine the M14 piston lacks a return spring; it is pushed back into place by the returning op rod.

Now, while all these are fun, there are variations on a theme. The M1 Garand and the AK are both vented long-stroke piston systems. On the Garand, the operating rod has clearance between the piston head and the gas cylinder. Too much, and it short-strokes. Checking piston and gas cylinder diameters is one of the gauging operations when M1 Garands were overhauled. The



The LWRCI piston system: a short-stroke with a piston that travels farther than the M1 Carbine, but is not as lengthy as the Garand.

armorers would mike the (or gauge) the operating rod head and the gas cylinder, and if they were too small (piston) or too large (cylinder) they'd be rejected and scrapped. Those that passed would then be subject to further inspections before being refurbished or used to rebuild rifles. The venting is built-in, not provided via ports, so some might argue the point and declare it to be an unvented system. Fine, whatever floats your boat.

The AK has vent holes in the gas piston tube. Once the head of the piston has traveled to the vent holes, they allow excess gas to escape. I'm not sure the AK has specs on the piston head size, but if it does I'm sure they are pretty generous. Venting allows for a larger variation in gas pressure while still ensuring safe and certain function.

In the short-stroke systems, the M1 Carbine is not vented. The gases fill the expansion chamber in the barrel lug and slap the piston, and that is that. The M14 is not vented either, but it instead is throttled. On the M14, the piston does not get gas on one end and push

the op rod on the other, like the M1 carbine. Instead, the gas travels into the piston, which essentially expands, pushing away from the front of the gas system, the only direction it can travel. The piston receives gas from the barrel port only for a short distance. Once the piston has traveled a certain distance, the gas port in the piston has slid out of alignment with, and far enough to no longer receive gas from, the barrel port. Over-pressure rounds shunt the piston faster, cutting off gas flow sooner, and low pressures slow gas shut-off, working longer. In theory, it should be a lot more forgiving of gas pressure variations. In practice, it worked pretty much like all other gas systems.

The FAL is all those and more. It is a venting short-stroke system, but it also has a piston return spring and a user-adjustable gas regulator. The gas port runs gas against the front of the piston, which is a long thin rod above the handguard. It pushes the bolt carrier back, but does not travel with it for more than an inch. Then the op rod returns, pushed by its own spring, as the bolt and



The AK is a long-stroke piston system, as the piston is connected to the op rod that works the bolt. Basically, an upside-down Garand, with an M1 Carbine-style bolt in it.



Like the Garand, the AK piston is not a tight fit, and gas blowby on the piston head is built into the system and calculated for function.



Once the AK piston has traveled far enough, it passes the vent holes, which bleed off gas. This works to prevent over-driving the system.

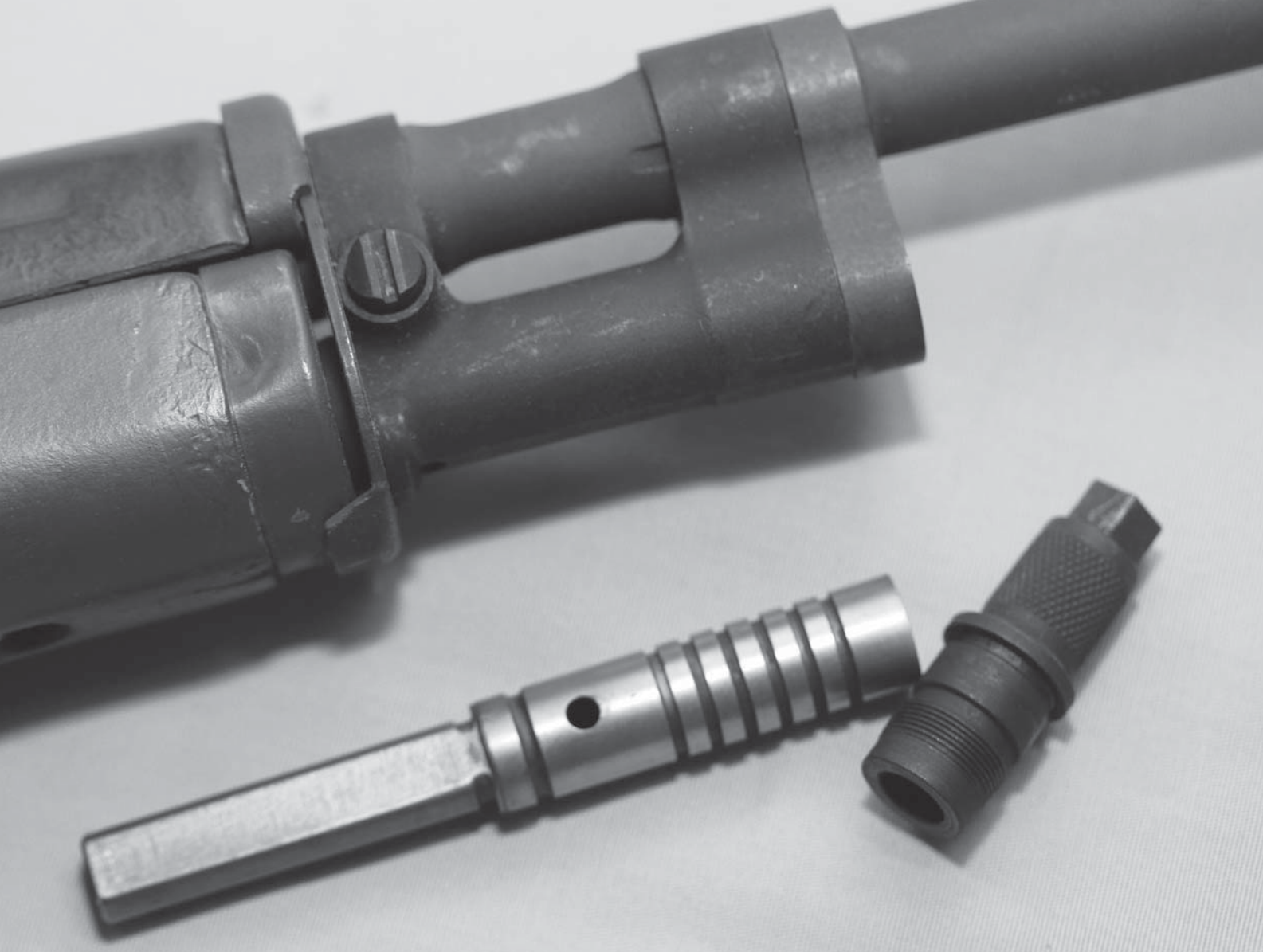
carrier work on theirs for their part of the action. The gases are vented directly up from the piston head, and by rotating an angled cover plate, you restrict the vent port (or not) to determine how much gas is used to push on the piston. On the Garand, AK, M14 and Carbine, the user had no control over the amount of gas used. On the FAL, you can change the gas available to the system by adjusting the numbered wheel right behind the front sight. While useful in theory, the usual result is an over-gassed rifle.

In summary, what all this means is that the hot, grubby gases are vented or used at some location away from the chamber. It does not mean that the dirt and heat have been negated, or transported to another dimension or location. The heat and powder residue still exist, they are just allowed to exist in a different location. More on that in a bit.

So, our basic gas piston overview has four types: long stroke, vented and unvented, and short-stroke vented and unvented. But there are a lot more variants that can be designed, conceived or made.

However, there is more to know. The basic gas laws of chemistry and physics explain everything, if you're willing to slog through the details. We have Boyle's Law and Charles' Law and they describe the situation from different perspectives. Robert Boyle postulated and then demonstrated that if you decrease the volume of a gas, you increase pressure. Jacques Charles postulated and then demonstrated that when you take a given volume of gas, and change its temperature, the volume will change (hotter means more volume) even as the pressure remains constant.

What does this mean for us? Simple. When the gas volume changes, temperature changes (the other



The M14/M1A piston has a vent hole in it. When it lines up with the gas port, gas flows. As the piston moves it closes off the gas flow, thus acting as a self-limiting system.

consequence of Charles' law.) Gas leaving the bore of your AR at 14,000 PSI goes into the gas tube, expands and cools. So, the gases that reach the carrier are cooled not just by the cooler metal they contact along the way, but also because of the expansion that happens along the way. Also, when they leave the barrel, the pressure of the entire system (the bullet still seals the bore at this point) drops, as there is a lot more volume to pressurize.

However, cooling does not mean condensing. The gas tube on the AR is remarkably self-cleaning. If buildup occurs, the pressure drop of the expansion doesn't occur to the same extent. Pressure slowly builds until the system blows the collected residue free. That doesn't keep the drill instructor from insisting that you clean

the gas tube. But it does mean that in the real world, cleaning the gas tube (unless something is really lodged in there) is a waste of time.

So, do not listen to your friend who asserts that the pressure your carrier experiences is the same as that existing in the bore at the moment the bullet uncovers the gas port. It is a lower pressure and lower temperature gas, although it's still hot and grubby.

One last gas law to keep track of: the Bernoulli principle. That tells us that as gas velocity in flow increases, pressure decreases. This is usually used to explain the lift of an aircraft wing, but it also describes the flow of fluids or gases in pipe or tubing. As the pressure drops, the gas flow velocity increases.



The FAL gas system has a return spring and depends on the user for proper gas flow.

This law also explains the apparent self-cleaning nature of gas tubes. Carbon can't build up, as the dynamics of gas flow don't permit it.

What does this mean for our piston gun? I repeat: you can't make the carbon go away, you just change where it gets left and how it builds up. In any venting system, the carbon will leave a hot, high-pressure area, and upon expanding, cool rapidly.

OK, a real-life example of what we're talking about: water vapor. There is water vapor in the air you breathe. The amount of water vapor the air can hold, and not lose, is called the saturation point. The absolute amount it can hold depends on the temperature and pressure of the air. Warmer air can "hold" more water vapor than cold. Imagine a muggy, oppressively humid day. Suddenly the temperature drops. What happens? As the temperature goes down, the amount of water vapor the air can hold decreases. When the amount it can hold falls below the amount that is there, water leaves its vapor state. It can become dew (the "dew point" weathermen talk about) or it can form fog.

The hot gases of your burned powder contain the particulate and vaporized elements of the combustion. When the gases cool, those constituents of the gases cannot stay in suspension, and they precipitate out. Since they are in the process of jetting out of the port, they get laid down as a hard deposit right near the vent port or ports. If your hand is there, they get deposited as hot carbon on your hand, which rapidly cools and is tough to scrub off.

That is why the carbon inside your receiver on your direct impingement gun is relatively soft (that, and the lube you slathered in there) and can be cleaned off – and why the carbon you'll see on your piston gun is hard, baked-on and has to be chipped away.

I had a Physics professor who summed up the Three Laws of Thermodynamics so succinctly that I still remember them:

- 1) You can't win.
- 2) You can't break even.
- 3) You can't get out of the game.



The gas settings of the FAL require a reasonably skilled operator to set properly. Otherwise, the system either short-strokes or is over-driven.

So, when someone tells you that their piston system is “revolutionary” and requires “no maintenance” and “no lubrication,” ask them how they’ve suspended the laws of physics and gotten around the laws of thermodynamics.

It can’t be done. And it is exactly this attitude toward the AR-15 in the earliest days that got the armed forces in such a pickle. Because the demo rifle Armalite had been shooting all over Asia had never been cleaned, and never malfunctioned, the DoD “Whiz Kids” whom Robert McNamara put in charge of the program insisted that not only did the rifle not have to be tested by Army Ordnance, it could not be changed and didn’t need cleaning equipment. So rifles arrived in Vietnam lacking any cleaning equipment at all. And since the existing rifles and machine guns were .30 caliber, their cleaning gear wasn’t going to work on the .22-caliber M16.

Piston Systems: Pros and Cons

The big drawback to the DI system is the gas blown back into the receiver. It does, however, have several manifest advantages, advantages you should not discard simply because all your buddies say you should. First of all, it is light. All the system needs is a hollow tube leading from the gas port back to the receiver. Unless you make your piston system out of unobtainium, it isn’t going to be that light, not ever. When you are laden with a whole lot of gear, lighter becomes very attractive.

Also, the hollow tube does not press on or bind the barrel, and so the barrel is essentially free-floated. If you use a free-float handguard, secured to the receiver at the barrel nut (and to the barrel not at all), the barrel is free-floated, and you can thus wring all the potential accuracy out of it that it has.

With a good barrel, an AR can be as accurate as a lovingly-blueprinted bolt gun.

The piston system removes all those advantages. First, it adds weight. Granted, some systems not so much, but they all add something. Second, part of the weight is a more secure (and often heavier) gizmo bolted on the barrel up front. That weight makes the barrel harmonics of firing a different thing than the DI system. You see, every time you fire, your barrel gets hit as if by a hammer. It vibrates. Accuracy is the bullet leaving the muzzle at the same point in the barrel harmonics on each shot. If the barrel harmonics vary, so will accuracy.

The piston system, working in or on the barrel block the new system requires, adds mass and potentially vibration, and also can potentially bind the barrel as the barrel heats. (Binding depends on how securely the piston system is held by the barrel/receiver geometry.) A superb barrel will have few or no stress lines in it. A bad barrel can have many. The stresses can be from the original steel bar, or be added in the machining or straightening process. As the barrel heats up, the stress lines “unkink” and the barrel points differently. It also changes the harmonics, and thus, potentially, accuracy. (A brief aside: hammer-forged barrels have the stress lines pounded out of them, and cryogenically-treated barrels have the stress lines relaxed.) If the piston is a firmly-held object between block/barrel and receiver, it can lever the receiver as the barrel heats up and unkinks.

The extra piston parts can hold heat. Also, as the barrel expands as it heats, the piston parts heat up at a different rate, and add another potential binding or pressing on the barrel.

The piston itself can also influence accuracy. When the M1 Garand was the king of the target range, everyone knew that if the op rod got bent, accuracy went all to hell. Bending op rods usually happened when someone used the wrong powder, one outside the burning rate range the Garand would accept, and the rod was over-worked. But once bent, it was “goodbye accuracy” and the situation could be restored only with a new, correctly-dimensioned op rod.

When the M14 became the target king, it did so only after armorers figured out that the barrel could not be free-floated and had to be pre-stressed. The USAMTU match specs call for welding the gas system and front plate together, and using that as a lever to pull the barrel down as it is locked in the stock. The barrel starts out

pre-loaded downwards, dampening the harmonics. If the bedding goes, the pre-load changes, and accuracy goes kerfloey. However, no need to replace parts there; “simply” re-bedding will do. However, every time the action was removed from the bedded stock, the bedding suffered a bit. Match shooters using the M14 became adept at cleaning their rifles without removing them from the stock.

The AR can be free-floated, even with a piston system, but the piston has to neutrally influence the barrel, or your accuracy, zero or both will change as the barrel heats up. With the DI system, not so much – nay, hardly at all, especially with a good barrel in it.

And, on top of all that, the piston system brings with it another problem: tilt. (Actually, two, but I’ll detail that in a bit.) When the DI system pressurizes the carrier, it basically pushes the carrier rearward axially. That is, the direction and location of the thrust is on, and in line with, the center of the carrier itself. Enter the piston system, which taps or pushes on the carrier up where the gas key used to be. The carrier tries to tilt in the upper and is restrained from doing so only by the buffer tube.

The buffer tube, being made of aluminum, is not at all happy with the steel carrier slamming down and gouging it. Now, the gouging isn’t all that bad, at least not what I’ve seen of it. And not all (even the early ones) piston systems tilt or gouge. Me, if I really felt the need to use a piston system, and found that it gouged the buffer tube, I’d perform a simple calculation: will the buffer tube last as long as the barrel? If it did/would, I’d simply view the cost of a replacement buffer tube as part of the cost of a new barrel, and not sweat it. If the tube wouldn’t, then a barrel replacement becomes a 2X or 3X buffer tube cost. At the moment, a plain old USGI-dimension, six-position carbine buffer tube costs \$25. A good barrel (there isn’t much point in buying a cheap barrel) starts at about \$200, and that is for a steel tube lacking sight, gas block (you’re going to take off the one for your piston system, right?), nut and such.

So, as long as it doesn’t cause a functioning problem, replacing the buffer tube is a fraction of the total cost to replace a shot-out barrel.

Oh, and the second problem with a piston system? Cost. If you use a replacement kit, you’ll be replacing the existing carrier with a piston-compatible carrier. If you buy a full-up rifle/carbine, you’ll be paying an extra for the design and fabrication costs of the new parts. Either



Piston systems do not make gas go away. They merely vent it in different locations. Here, the gas is venting directly behind the front sight, as it is meant to.

way, your new piston-equipped rifle is going to cost a bit more than a plain old DI-running one.

So, should you go piston or not? That depends. One group who benefit greatly from a piston system are those who own suppressors. The delayed gas flow (that's how a suppressor works: it delays the gas flow out the muzzle, to reduce noise) means more gas and gunk blown back into the receiver on a DI rifle. Depending on minor variables in each rifle, running with a "can" can mean a gun that looks like a 4th of July charcoal grill after a few magazines, or simply a more-difficult cleaning job after a day of shooting.

A piston system on a rifle with a suppressor (especially a piston system with an adjustable flow valve) can make shooting with a "can" a pleasant time.

Another group that finds favor with piston systems are those with SBRs. The short barreled rifle crowd often find that a short-barrel DI system is just too touchy, or in order to be reliable, has to run too violently. Let's take a look at the math involved.

Our bullet screams past the gas port, and thus allows gas to flow into the system. The bullet continues onward, and the system remains sealed until the bullet leaves



the muzzle. How long is that? The time period is called the “gas dwell time,” by the way. Well, on a twenty-inch rifle, we have a 55-grain FMJ bullet leaving the muzzle at some 3200 fps. That means that the distance from the gas port to the muzzle, some 6.5 inches, produces 0.00017 seconds of sealed-bore gas dwell time. (Those who know their mathematics realize that it is not simple arithmetic, but a calculus application, but I’m fine with rounding the numbers for this demonstration.) So, .17 milliseconds of time, which is less than the duration of a typical camera flash at its peak.

On a CAR with a 16-inch barrel, that dwell time is .24 milliseconds, an improvement, but from there it goes backwards. The M4, with its 14.5-inch barrel, gives us .19 milliseconds, and an 11.5-inch SBR produces a miniscule .11 millisecond dwell time. To ensure that the short-barreled rifle works, you have to open the port to get more of the gas working for you.

Piston systems are much less touchy. You see, you can hammer the system with as much gas as you need, and use a built-in gas bleed, or a self-limiting piston, to control over-driving it. Use a piston system and the SBR becomes a far less touchy creature, working with a wider array of ammunition, bullet weights and loads, and doing so with greater reliability.

So, those of you with SBRs may find a piston system advantageous. The rest of us? Not so much.

Finally, cost. Part of the cost of a piston system is the piston system itself and the R&D that went into developing it, as well as the tooling costs to fabricate the piston parts. However, a fondness for the good old days clouds the issue. There are still a number of shooters who remember fondly the \$600 AR they bought “back when [fill in the blank].” Inflation aside, let’s look at the “\$600 AR” they bought. It probably had plain plastic handguards, maybe the A2/M4 type, maybe not. They certainly weren’t railed, free-float handguards. The stock was either an A1, an A2, or an old-style CAR stock. Not one that holds batteries or offers a solid cheek weld.

The sights were either A1 or A2, no flat-top, and no place to mount a scope except in the carry handle. Which sucked. And the barrel? Maybe it was a 1:12 twist “pencil” barrel, and maybe it was something heavier. But wasn’t the premium tube we now expect, in this age of the sub-MOA AR. In fact, it wasn’t a rifle many of today’s shooters would pay \$600 for, and that is with less-valuable inflated dollars. Adjusted for inflation, that 1986 AR you paid \$600 for would run you \$1,186.54 in Obamadollars. So, before you go grumbling about “how expensive ARs have gotten,” consider what it takes to upgrade the \$600/\$1187 AR with a new stock, railed handguard, better barrel and flat-top upper. All of a sudden, an “expensive” AR doesn’t seem so bad, does it? Throw in a piston system and they are almost reasonable.

So, go to a piston if you want. Stick with a direct impingement if you want. Add all the features you want or don’t want, but don’t grumble about the cost. For what we get today, the AR has never been a better deal.

HK ENGINEERING

CHAPTER 3



Yes, testing guns is fun. But it is work, too, even though I didn't have to pick up brass, clean the rifle, or even wipe the mud off the magazines. You're right, it doesn't sound like work.



The HK sight design of which they are so proud.

Let's start our foray into piston-driven territory with the near-legendary and certainly fabled HK416. After all, as one mystery writer has asserted, if you want to have a novel that is successful, start by throwing a body out of the window.

The HK416 is the latest hot property, and for a while was the savior of the whole "DI rifles suck" problem/crowd/movement. And, in typical firearms industry *sturm und drang*, it was the center of a messy, turbulent mess that caused hard feelings and a few broken relationships.

When first unveiled, the 416 was sent out to a few gun writers (I was not among them, alas) as conversion uppers. Not complete rifles. A few very clever writers took one look at the enclosed invoice, and promptly sent a check off to HK for the amount listed. I guess those at HK who shipped the samples and those in Accounting

who received the checks didn't talk to each other for a while, because in due time HK asked for the uppers back. When told "Nope, I bought that, at the invoice price," there was a whole lot of huffing and puffing. Part of the problem was that the recent ruling on imported parts kits was a real head-scratcher. You see, when the powers-that-be found out there was a torrent of AK parts kits (and some other firearms as well) coming into the country, they had to put a stop to it, and right now. (Can't have the great unwashed making their own rifles now, can we?) The easiest way to put a wrench in the works was to declare that barrels couldn't be imported as parts kits. As the most difficult and expensive part, the barrel not being in a kit was a deal-breaker.

The ATFE asserted that the barrel, as part of the "parts kit" that the 416 uppers represented, constituted an unlawfully-imported part, unless sales were restricted



It almost takes three hands to change the sight settings on an HK. I sometimes think that is deliberate.

to Class III dealers, law enforcement, etc. Cooler heads prevailed, and I can only imagine that happened when someone in the legal department explained the risk of appearing in court on the matter. Imagine a defendant, displaying a parts kit, in all its disassembled glory, while the government tries to prove that a fully-assembled upper is “the same thing.”

Oh, what a mess. And just when it seemed the whole thing would die down, one of the uppers surfaced on the internet, being auctioned off. The sale price of some five grand was enough to give all involved apoplexy all over again. And to make matters worse, other uppers appeared from time to time, as police departments that had bought guns sold off the parts. Do the math: a police department can purchase a machine gun at what amounts to the wholesale price. Let’s assume just for the purposes of illustration that Mayberry PD buys an HK416 for each member of the department. At \$1,000 each, a big deal. A few years down the road, the new Chief decides that shotguns were better, anyway. The uppers, sold on the open market (they’re just uppers, after all) could go for \$2,500 to \$3,000 each, maybe more. The



Even setting windage, you need the tool.

Here's what you need to adjust an HK rear sight. Lose these, and you'll be applying "kentucky windage" all the time.



The 416 feels heavier than the listed weight. Not that that is a problem, hammering out full-mag full-auto dumps.

lowers? Strip the parts off, sell those too, crush the lowers so they still show the serial number, and leave them in the property room. The new Chief just “found” two grand per officer or more in the budget and looks like a hero to the city council. Meanwhile, HK is tearing their hair out, trying to keep the government happy.

As I said, a mess.

What was the big deal? Simple: overseas manufacturers have to jump through hoops to get sample firearms into the US. No, not like having to ask “mother, may I?” five times, but hurdles that are involved, arcane and expensive.

To get more in, the relevant office at HK would have to do the whole thing over again. No wonder they were



Add optics, a light and a laser (AN/PEQ-2/A) and even a light rifle becomes heavy.

frosted. And with ATFE breathing down their necks, importing hundreds as police demo guns would be scrutinized even more closely.

And the writers? Well, if HK in the end did not choose to import the 416 uppers, then they had one opportunity, and one only, to acquire such a rarity. And I might point out that it is not at all unusual for manufacturers to float R&D samples as prospective new guns, and in the end not make/import them.

The upper itself, which became an entire rifle? For a while it was a military- and police-only rifle, as it was comprised of all-imported parts (never mind the select-fire feature) that made it entirely different from your run of the mill AR-15, and thus not available for sale to us, the hard-working people being protected. The resulting

rifle was the HK-made AR-15/M16/M4, but with the 416 upper on it and a few changes HK made along the way. More on that in a bit.

My chance to test a 416 came with a visit to Blackwater, now Xe Services, and home of the U.S. Training Center. The plan was that HK would send a rifle to the range, and I'd show up for an HK-specific class where I'd use the rifle all week. Those who know HK would not be surprised to find out that upon my arrival I discovered a few things: there was no HK-supplied rifle. There was no HK-specific class. There was me, a 416 rifle out of the range armory, and a small class for carbine instruction. I was the only one using an HK rifle. HKs involvement was to say to Blackwater/Xe, "Yes, he can use one of our rifles on your range."



Even after a week of hard use, no cleaning, and a non-magnifying optic, the 416 shot well.

So, each day I'd check the rifle (the serial number was the same) out of the armory. And each night, once I was done, I'd hand it back in. No problem for me, as the small class meant I could pretty much do what I wanted, photograph anything I cared to, and inspect the rifle to my heart's content. Had I wished to, I had the time to produce a detailed set of drawings and blueprints, measured with digital micrometer. Now, before the folks at HK have an attack of the vapors at reading this and their competitors scramble to find my contact info, I did not measure and draw. HK asked me not to, so I didn't. Because the class was small, I managed to go through a class-and-a-half worth of ammo, starting with three thousand rounds of Hornady steel-cased practice ammo. Yes, it was fun.

Before we settle down to kick the tires, slam the doors and criticize the paint job, let's take a walk around it and look things over.

At first, it appears to be like every other modern AR: railed, free-float handguard, telescoping stock, folding

sights, a plethora of sling swivel attachment points. The safety is ambidextrous, and the markings are pictograms: pictures that convey a single idea. In the case of the 416 (now known/soon to be known as the MR556 in its semi-auto only civilian version) the pictograms are a white bullet in a box, with an "X" over it, and a box with bullet in it, painted red. The select fire ones show the bullet in an open-ended box, and the numeral "30" in front of it. No burst-set yet, but I'd bet swapping a Colt burst trigger set into the HK416 would not be a problem for a competent AR wrangler. Then again, HK keeps things close to the vest, and the model I played with, a "D" version, may be the auto, and there may well be a burst-fire one too.

I cannot say, as the police departments that manage to lay hands on HK product are reluctant to talk about it too much, HK even less so. The markings are on both sides of the lower.

Up top, HK has a proprietary folding front sight, at least now. The one I tested had a clamp-on set of HK



If you want to know how well something works, use it hard in all-weather. Gravel? Better than mud.

sights, which I struggled with all week. I can grasp the concept of the HK sighting system, but I guess I'm too old-school. I just don't like it. The method is simple: the ring around the front sight centers the front in the rear aperture, and the two combined provide a fast, "circle in circle" aiming system, while allowing for a more precise aiming using the front post. Invariably, I find myself shortening the stock (at least, on the HK models that allow it), using the rear aperture as a sort of ghost ring, and ignoring the front circle, using just the front post for aiming.

Perhaps the most heinous aspect of the HK sight design is that you need a special tool, a Phillips-head screwdriver, and three hands to make any change in the rear sight zero. And since that's where all the sight adjustments are done, you must have the tool. If you do not, you aren't going to be making any changes to the sights, even with a ball-peen hammer.

Had it been mine, the first thing I'd have done is remove the HK sights and put on sights from someone else, like Troy, Midwest Industries, or GG&G. But it was not, so I worked with what was there.

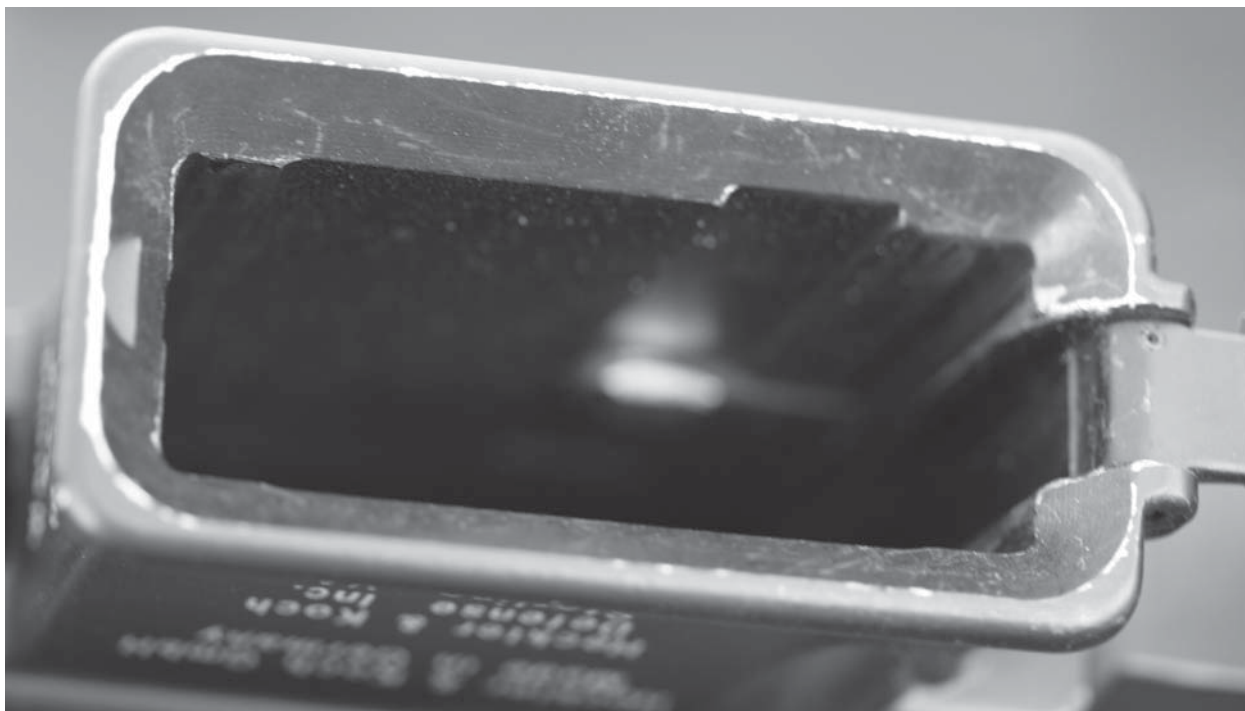
The lower looks like any other AR/M16 lower, but with one endearing HK touch: magazine conflicts. Back a couple of decades ago, the British were finally fed up with the sorry state of the SA80 rifle they were using.



The selector on the 416 makes clear its status, even if you overlook the little pin on top.

It earned a miserable reputation in the First Gulf War, and the MOD (Ministry of Defence) decided it had to be improved. While the various reports indicated that there were some 50 problems, seven were “corrected,”

to no avail. A decade later, the whole sorry lot was turned over to HK (at the time owned by a British small arms company, Royal Ordnance) and redesigned and overhauled.



The 416 mag well works only with USGI magazines and HK high-reliability magazines. Everything else is a “try it and see” proposition.



This one, made in Germany, is allowed for LEO and military use only. The rest of us need not apply. Not HK's rule, by the way.

One thing HK determined was that the magazines being used were inadequate. So, they designed new magazines, the now STANAG 4179, or steel HK mag. (Stick with me.) When making the magazine “better” they changed some external dimensions. Later, when designing/making the 416, HK made it work with their own magazines.

And as a result, the 416 (and presumably but unknown at this time, the MR556) does not work with some AR-acceptable magazines. No kidding. I traveled to the rendezvous with a supply of magazines, just to be sure. And some didn’t work. I ended up spending a lot of my time simply using the HK mags, just to make sure I was not biasing the test. If you buy an MR556 (none of us will be able to purchase a 416 until Federal Law is changed) resign yourself to the possible fact that some of your magazines won’t work in your new Teutonic purchase. That is, unless HK relents and redesigns the one for the US so it takes all magazines. The situation is such a headache that Magpul makes a special version of their magazine, the EMag, just for the HK series of rifles.

The forearm is a railed, free-float handguard, but in typical HK/German fashion, it’s designed to be an alternative part in a girder bridge. No kidding, it appears stout enough to drive over without harm. Which leads to the last point before we delve inside: weight. The

listed weight of the 14.5-inch version is 7.7 pounds. My editor will not permit me to exclaim on that figure or call it horse apples, so let’s just say that it is hopelessly optimistic. I’ve handled seven-pound rifles, and I’ve handled nine-pound rifles. While I neglected to schlep a scale with me on that road trip, let me tell you that my experienced arm told me the 416 was closer to the latter figure than the former. You can’t have highway overpass-durability without paying the price in mass, and HK paid the price.

Inside, HK built a gas piston system, and here I have to take my hat off to them, as they came up with a very clever piston arrangement. However, to get to it, you have to disassemble the rifle in a way that makes me cringe. Unload, check again, then open the action. Remove the bolt and charging handle, all in the normal fashion. Then, take the bolt, and look for the screw on the right side that looks like a Phillips-head screw. (The phillips-head screw was first adopted by Cadillac in 1937, as it made assembly easier. In case you wondered; the screw is designed for the screwdriver to cam up out when it reaches its torque limits. Torturer.)

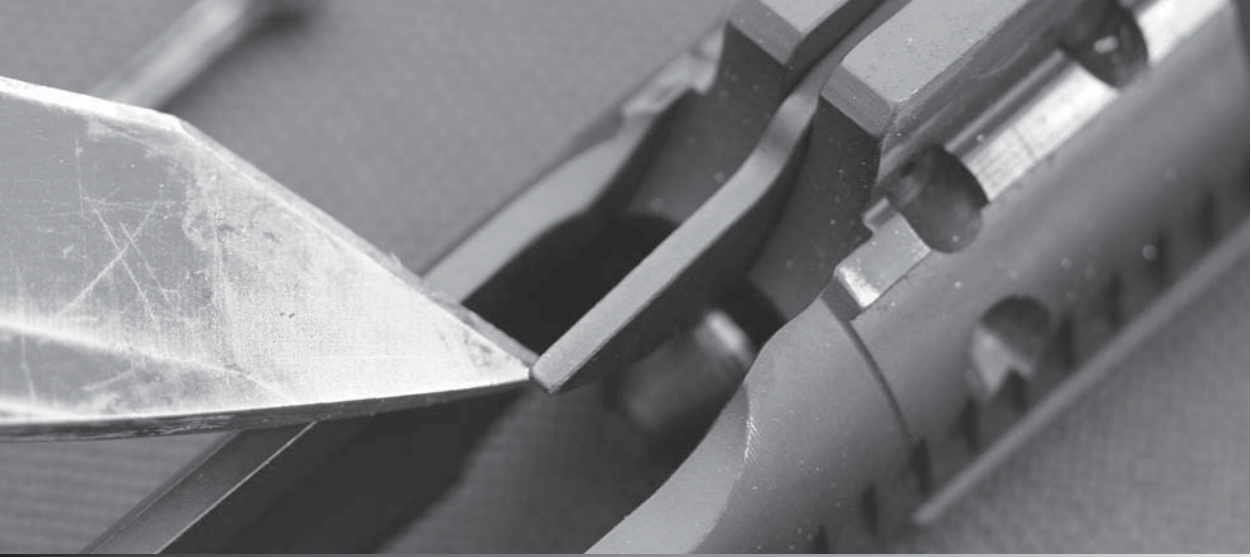
Take the bolt, put a lug of the bolt into a slot of the screwhead you see, and using the carrier as a wrench, unscrew the bolt. Gack! Horrors! You’ve got to be kidding! No, I’m not. And neither is HK. You actually use



The removable forearm has a key and slot arrangement with the upper receiver. It comes back to zero well enough for irons and CQB. I’m not sure I’d depend on it for a precise sniper-type arrangement.



This is the fastener that locks the forearm in place. You use the bolt to unscrew it.



This is the firing pin safety. As the hammer comes up, it lifts the tail of the safety, unlocking the firing pin.



The firing pin has a return spring, as well as the safety.

the bolt as the tool to unscrew the fastener that holds the forearm on. Now, theoretically, I know this is no big deal. The bolt, as a hardened alloy steel part, certainly has a tensile strength on the order of 130,000 pounds. Even as strong as I am (I'm not a world's strongest man competitor, but I'm no weakling) the best I could muster would be perhaps 130 ft-lbs of torque. So, I'm certainly

short at a thousandth of the failure strength of the bolt. But still...

Having steeled yourself to use the bolt in such a reprehensible fashion, you unscrew the fastener, pull it out, and now can slide the railed forearm off the rifle.

What a minute, what about the sight? It is attached to the handguard, and removing the handguard is

certain to change the zero, right? Theoretically, yes. HK clearly feels that the wandering zero is going to be a small enough issue that it isn't an issue. The math gives us a clue. The sight radius on the 416 is much the same as that of an M4: 14 inches. A simple bit of geometry tells us (the law of equal triangles) that for each .001-inch misalignment of the front sight, the point of impact of the bullet shifts by a quarter-inch at 100 yards. Clearly HK expects the forearm to re-align itself on assembly to within .004-inch, and thus the zero won't wander more than an inch at 100 yards.

To that end, they make the forearm and the receiver set as a tongue-and-groove/mortise-and-tenon setup. The tail on the forearm nestles into the slot on the receiver, bringing the forearm back to zero each time. And, on the planned-for MR556, the front sight is attached to the barrel, so no big deal.

Having unlocked the forearm, you simply slide it forward off of the rifle.

What you see before you is the HK piston system, basically the G36 system adapted to the M16. It is an un-linked piston and rod, short-stroke, non self-throttling design. However, the lack of self-throttling is addressed in a very clever fashion. To disassemble, simply grasp the shiny part of the middle, just ahead of the spring, and pull it back. The piston won't come out unless it is very clean, and then only maybe. Once you've pulled the rod clear of the piston, you can then wrestle the piston out of the barrel block, or squirm it off the front of the rod.

Once the piston is off, you can tip the rod enough as you ease the spring forward, to clear the barrel block, and the parts then come off the rifle. That's it, those are all the parts.

The piston system is very interesting, and HK has dealt with the non-bleeding system in a very clever way. The piston itself is a cylinder with a cone on the front end of it, and a tip on the cone. The cone rests inside a small tunnel, such that when the gases come out of the barrel, they can act only on the tip of the "nipple" of the piston. Thus, they act at high pressure on a very small area. Thus, the 416 piston starts with a small push instead of a slap.

Then, as the piston tip slides out of the small tunnel bored for it, it allows gas flow to reach the cone-shaped section of the piston. However, by this time gas pressure has already dropped some, and the very large (relatively speaking) increase in volume drops the pressure even more. The result is a piston system that self-meters to



Even though it is a piston-driven system, the bolt is going to get crusty from carbon.

provide a push on the piston system instead of a sharp rap. The result should be a softer-shooting system, provided the total gas flow isn't enough to over-drive the system. However, any comparison of relative recoil has to take into account the greater weight of the HK416. I mean, really, comparing a nearly 9-pound 416 to a piston-conversion M4 clone that barely tips the scales at 7.5 isn't fair. The lighter gun will seem to recoil harsher than the heavier one, almost regardless of the system they use.

The piston, rod, spring and retainer are all of a good size and easy to scrub to keep clean. The retainer, the rear-most portion of the assembly, is a bored rod to guide the piston. It is also relieved on one side, to line up with and fit over the HK barrel nut.

Inside, HK has done more work. The bolt is obviously a bit different. Since there is no gas flow into the receiver, the tail of the bolt need not be relieved for gas flow and escape. So the bolt is a cylinder with locking lugs on it. The cam pin is much the same, but the firing pin is not. The head is shaped differently, and HK has seen fit to include a firing pin return spring in the bolt as well. As if all that weren't enough, the carrier is modified. Obviously, the gas key is gone, replaced by a thrust lug for the piston to shove. However, the thrust lug also contains a spring-loaded lever. The lever locks the firing pin in place. As the hammer rises, the top surface of it pushes the lever, lifting it, and releasing the firing pin. By the time the hammer strikes the firing pin, the lever has been fully unlocked, and the firing pin is free to move forward, propelled by the hammer.

Why? Beats the heck out of me. HK obviously thought that the decades-old method of firing pin control, "keep it light," wasn't sufficient for their rifle. It also means that should you ever lay hands on a 416



Here it is: the factory-approved method of unscrewing the forearm fastener. Stop cringing, it's German, so it's plenty tough enough.

upper to put on your AR-15 lower, you may have to fuss over the hammer to make sure it properly engages the firing pin lock.

The carrier has raised pads at the rear to combat carrier tilt. The internals of the lower appeared to be bog-standard mil-spec select fire parts, but I really wasn't all that interested in them. I just took an occasional glance inside to make sure there weren't any egregious chunks of debris floating about, stuff that might cause a problem.

In function, the 416 worked just fine. The first day, I learned the controls, I got some trigger time, and I generally just checked the magazines I had, while doing drills and learning the ropes.

After that, I started each day of the rest of the week the same way: I'd set up the camera for the best light, rig my radio remote, set the camera on high-speed frame rate, (6.5 frames per second) and hold down the shutter button while I fired off three or four full-magazine dumps on full auto. I wanted to get pictures of lots of brass in the air, but I also wanted to see what the cumulative recoil and cyclic rate was like. Once done, I'd then proceed with the class.

How did it feel? Just fine. The cyclic rate is fast but not excessively so. The felt recoil is no big deal, and control while I fired was easy. With full-mag dumps

and no cleaning (I didn't clean it, and it certainly didn't get cleaned each night after I turned it in) I reasoned I had a pretty good test to see what it could take. On the first day, when I was inspecting and photographing it, I wiped off the lube. Not degreased, but wiped with a dry cloth and didn't add more. As anyone who isn't a complete HK fan could predict, I managed to make it malfunction. One the second day, just past the 700-round mark, it failed to push a round up out of the magazine and into the chamber. Not a bolt-over-base failure, and probably not a short-stroke. I worked the charging handle and kept on, to have it do the same a few rounds later.

I stripped it, gave it a cursory cleaning, added a bit of lube, and went on. That was the failure rate for the 416.

With the EOTech sight on, I was able to shoot head shots at 100 yards. I didn't have a chance to do a full-on test of accuracy, as the class structure just wasn't set up for gun writer fussiness. But the accuracy was plenty good enough to whack gongs out to 400 yards or so, until the wind started making aiming more a judgment of wind than of holding on the plate.

Now, why is the 416, a "carbine with a piston," heavier than a comparable M4? Because of the HK insistence on things being "right." First of all, the barrel nut, the part that screws into the receiver and holds the barrel



The 416 gas system, uncovered. Note the husky barrel nut, which acts as a heat sink (and adds weight to the 416).

on, is not a standard AR barrel nut. It has perhaps three times the mass, a honking big chunk of steel that not only holds the barrel in place, but acts as a heat sink. I was not allowed to take the rifle apart past field-stripping for cleaning, but I'd bet that under there the 416 is not compatible with standard AR barrels. So on top of everything else, if you do ever acquire a 416 upper and you wear out the barrel, you will be going back to HK for a new barrel. And probably installed by them, too. That will cost a lot more than a regular barrel change.

The barrel itself is also heavier, hammer-forged and made of a speciality steel, up to HK standards. They have a policy that every single firearm they make must survive "the test." That is, a lodged bullet, with a round fired behind it, must not injure the shooter. The firearm also must continue to function more or less normally. That means a heavier barrel than your basic M4 clone.

There's a video you can hunt down. (As long as it is available. It keeps popping up on the net, getting removed, and coming back.) It shows a German shooter (variously described as "German Special Forces" "German SEAL" and "German Delta" member) who is in a water-filled hole. He pops up and fires the HK, and it fires normally.

Then, he pops up and fires an "M16." The M16 blows apart. This shows the superiority of the 416. No, actually what it shows is the advances in steel technology, alloying and what a heavier barrel will do for you.

Remember, the M16/M4 is the epitome of technology, circa 1957. Complaining that the AR doesn't do what a rifle composed of alloys circa 2002 can do is like sitting in a 1957 Chevy Bel Air and complaining that "there's no place to plug in my iPod." Let Colt make an M4 with modern alloys, and at the weight the 416 is nudging, and it will do a lot better, perhaps even match the 416.

Is the 416 better than other rifles? (Or uppers, in the instance of not being able to buy the whole thing.) Yes and no. Yes, in that you'll get a rugged, reliable piston-driven upper. No, in that you are going to pay HK prices and have to put up with HK weight to use it. The HK MR556 is supposed to be available "soon." Well, I saw the first ones at the 2009 SHOT Show. They had new ones up for display at the 2010 SHOT Show. I can imagine quite readily that they will have yet another set of display MR556 rifles at the 2011 SHOT Show, with the assurance that they will be "Available 4Q 2011."



Yes, it is a good barrel. Yes, it is plenty tough. It is not, however, mil-spec. Remember that, the next time you insist on a mil-spec barrel.



Bayonet lug, sling loops, bipod attachment, folding sight boss, this gas block does everything but sing you to sleep at night.

I'm not picking on HK in this regard. In the array of made-up natural laws, the quips and observations of what real life is like, one of my favorite is "Cheops' Law." He's the second pharaoh of the Fourth dynasty, and the Pharaoh who built the pyramids – well, the first one, the Great Pyramid, the biggie of the three. Cheops' Law is simple: "Everything goes over budget and over schedule. Everything."

HK won't be the first to have problems meeting a marketing deadline, and not the last, and they certainly aren't the first to run into red tape on importation. Also, since the importation of complete firearms of this type is prohibited, HK will have to have some (perhaps even many) of the parts manufactured here. Either by themselves, or sub-contracted. That adds a whole new layer of complexity to the problem, and produces headaches you can only imagine.

Buy it when you see it, if your budget allows. Until then, don't torture yourself with thoughts of "I can't buy this other AR, because any day now the MR556 will be available." It is good, but not self-flagellatingly good.

I know of one gun writer who has an HK416 upper unfired in the shipping box. He refers to it as "my 401K" since he figures that even once the MR556 is available, it will be marked differently than his 416.

The 416 also contributed to a couple of other minor flare-ups. In the Armed Forces, special units have

their own budget. It seems that when the 416 became available, those special units bought 416s. If you had a sharp eye, you could see them in photographs coming back from the sandbox. After a gradually rising level of consternation, with regular units asking "why can't we get those?" the special units were told to use the 416s until they were used up, and transition back to the same small arms that the rest of the group used.

And when the MR556 was first proposed, HK told us that the takedown pins would have a different spacing. Yes, the 416 upper would not fit on a standard AR lower and could only be used on a semi-auto only MR556 lower. Why? German law forbade the manufacture otherwise, even for export. I think the staff at HK got tired of hearing from every single person who found that out ("Do that, and I won't buy one") and prevailed on the home office to find a solution. Last I heard, the takedown pin spacing was going to be the same as all other ARs, so you may finally get a chance to buy an HK piston-driven upper.

Just be patient.

CHAPTER 4

LWRCI



About the only thing I've changed on the A2 is the pistol grip: the MIAD back panel is too much for my very odd shooting style. Easy enough to fix.



The M6A2, with EOTech optics and magnifier on it, makes for a very effective combo.

LWRCI has not always had the sterling reputation it now enjoys. When LWRC was begun, it was more of an R&D outfit than a production company. I've seen ATFE production figures over the years, and one year in the early days of the company, LWRC (the old company) was listed as having produced a grand total of two rifles for that whole year.

Well, that wasn't good enough, so after some reorganization (and saying goodbye to the old bosses) LWRCI was formed, and it proceeded to produce a piston-system rifle. A whole slew of them, in fact.

For the latest tests on ARs, they sent me three, basically because I couldn't get all of them, and they didn't have the .308 ready at that time. (It is now, but that's a subject for another book, not this one.) The five rifles they make are the M6, M6A1, M6A2, M6A3 and the PSD. There are variants, such as the M6A1 Patrolmans rifle, but it's just an M6A1 with a few things changed, not a different model.

The models differ thusly: the M6 is a polymer handguard M4 clone; the M6A1 has a railed forearm; the M6A2 has a railed forearm with a folding front



The folding rear is marked LWRCI, but it is clearly a Troy sight. Good gear.

sight on the handguard; the M6A3 uses a folding front sight that is built into the gas block (and is available in an 18-inch barrel DMR version) and its gas block has a built-in regulator. You can adjust gas flow for decreased gas (using a suppressor), increased gas (adverse conditions), and no gas (save your brass and not disclose your position with tossing it away). The PSD is an SBR with an eight-inch barrel and a gas system proportioned to accommodate the stubby barrel. They also make the M6A4, but as it is a select-fire version (closed bolt on the semi-, open bolt on the full-auto settings) it is available only for law enforcement, military and export. My home state is down on SBRs, so I can't get a loaner PSD to test, and the Hughes amendment to FOPA 1986 makes ownership of a newly-made select-fire firearm impossible without the relevant (and expensive) federal licensing. So it was a no-go there. All the models can be had in 6.8 Remington SPC, and if your department or agency wants them in select fire, well, LWRCI can do that. Nothing personal, but there aren't a whole lot of law enforcement officers, deputies or agents with whom I'd be all that comfortable issuing a select-fire SBR in 6.8. Pass the patrol rifle course we teach, and we can talk about it.

However, the three LWRCI me sent were plenty good enough to thrash, test and report on.



The magnifier makes the EOTech into a 3X red-dot scope. Plenty good to 300 meters.



Despite the markings, the LWRCI semi-auto rifles do not flip over to full.



Uppers and lowers are clearly marked as to who made them and which model they are.

The LWRCI system, at least on the railed guns, is easy to gain access to. You simply unscrew the front bolts that secure the top rail cover on the handguard. Now, I have to give you fair warning and point out a nice but a bit fussy detail on the LWRCI handguards: the screws are captured screws. They are retained by small “C” clips on the threaded portion. Unscrew, and when you feel resistance, stop. Now, if you were to take the cover off in very cold weather, and due to the cold have to use a screwdriver (tight metal and stiff fingers) you’d risk the mangling of the “c” clips. Once knarfed, you’d need to write to LWRCI for replacements, which are small but important. (Long-time readers might well have guessed just how it is that I know this particular bit of information.)

Once the cover is off, you can see the details of the piston system. It is a short-stroke, venting system with a piston and rod. The piston, unlike that of the HK416, does not ride into the gas block but acts as a cup over the spigot of the gas tube protruding from the block. The disassembly is easy: once the rifle is unloaded, just grab the connecting rod (the system has the piston cup,



The trigger guard is of the new, oversized (but not ugly) design.



The top rail comes off, to clean the piston system, by unscrewing the two knobs on front.

two rods, a spring and a spring cup) and pull it back. Once the center rod is pulled back far enough, it clears the piston cup and can be tilted and removed. The rest then simply gets pulled out or off. It is simple enough that once you see and do it, if you can't figure it out, you probably shouldn't be using sharp objects.

The piston cup has a pair of vent holes that bleed off gas once it has traveled a short distance off the gas block nozzle.

Unlike other piston designs, LWRCI decided not to go with a new carrier that had an integral thrust shoulder on it. I can imagine that one of the considerations that went into it was the need for such a design to start with larger-diameter stock, stock that would then require that most of the extra steel be machined away.

Instead, LWRCI went with a modified standard carrier. The rear has anti-tilt pads, an easy thing to accommodate in the machining operation (carriers are machined on million-dollar CNC machining stations, with every dimension tracked to a thousandth or less) and a lot easier on the tooling, machine and production schedule than a much larger bar that the shouldered-carrier would need.



The A1 came with a Daniel Defense rear sight, a solid and a fixed sight that can still be removed if you wish.



A start to sight-in: a 100 yard group, bench-rested and in nice weather.

Then, the finished carrier has a large dovetail machined in it at the top and the piston thrust block is pressed into place. Someone is going to object that a dovetailed block is not going to be as strong as an integral block, and they'd be right. But either system

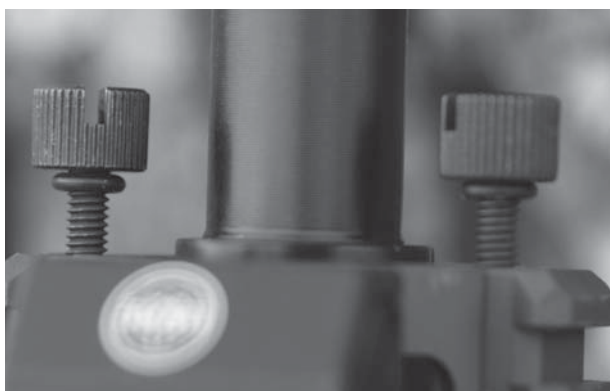
is ten times stronger (or more) than needed or than it will ever have to deal with, so the consideration to the end-user is theoretical at best. The thrust block looks like a gas key on steroids, and it is also a lot stronger than it would have to be.



A 300-yard group, in a driving rain, with the Zeiss 1.1-4X scope set to 4X.



The LWRCI gas piston in all its glory. You won't need to do much more than this to keep it running.



The two screws are captured and do not come out – unless you over-torque them, and then you'll need new "c" clips.

As an additional boost, the carrier on the LWRCI rifles is given a high-tech coating, a proprietary nickel plating that increases lubricity and eases cleaning. (However, the wag in me can't help but point out that one of the big selling points of the piston system in general is the lack of fouling blown into the receiver, thus less cleaning required, but hey...) The bolt is a mil-spec bolt, in all its glory and with all its shortcomings. But we aren't ready yet to thrash the bolt of the AR in general, so we'll move on.

The barrel of the LWRCI rifles is made of 41V45 alloy, an alloy that closely matches mil-spec 4150, but with a higher tensile strength and greater resistance to fracturing. The barrel blanks are turned, bored, reamed, polished and then fed into a hammer-forging machine that spits out finished barrels. For those who have not been paying attention to barrel technology, hammer-forging is a method whereby an over-sized and too-short barrel blank gets pounded by hydraulic hammers around a mandrel shaped like the chamber and bore, complete with rifling. The steel gets hammered right down to the mandrel, forming the chamber, bore and rifling, and then the mandrel is pulled out.

The result is a bore that is as smooth as the mandrel (and the polishing of the reamed bore of the blank) and lacks the stresses induced by machining that regular barrels have. In addition to the lack of stress risers, the crystalline structure of the barrel has been made more uniform and smaller and denser by the pounding it has received. Thus, it is stronger and straighter, lacks stress risers, and is far more uniform than a regular barrel.

There are a few drawbacks to the process: the hammer-forging machine is hideously expensive, both to buy and use, and not all alloys can be hammer-forged. In



The NiCorr barrel, harder than a cheap import file, and more resistant to corrosion than a Benedictine nun.



The LWRCI carrier is machined for a dovetail, and the op rod impact shoulder is secured in place. They have since gone to a one-piece carrier.

fact, some alloys are made worse, even scrap, if used in a hammer-forging machine. If you want to do this, you have to resign your budget to using only the good alloys.

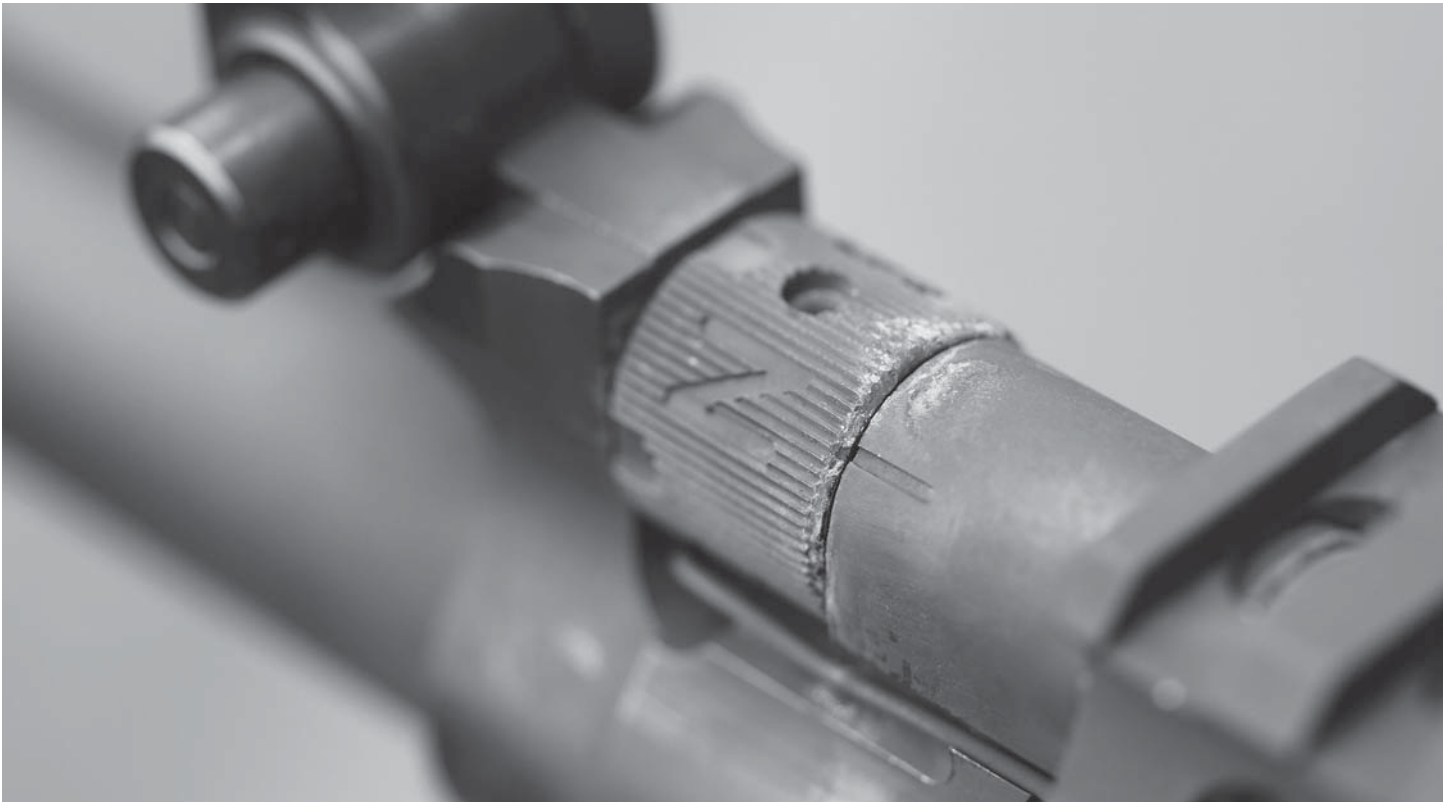
The resulting barrel is not mil-spec, not by any measure, but it is far superior to a mil-spec barrel. Again, the one advantage of mil-spec is that it is known and of high quality. But it isn't the newest thing available.

Then, to gild the lily, LWRCI goes further. LWRCI treats the barrel to their NiCorr finish. This is a nitriding finish that is not a coating but a treatment. NiCorr treats

the surface of the steel such that it is harder than a cheap file, and more resistant to corrosion than traditional treatments. Inside, it is more uniform, slicker and durable than hard chrome. Outside, it makes Parkerizing look like a cheap paint job.

On the back end, the buffer tube is mil-spec diameter, so you can remove the stock that is there and replace it with any other mil-spec diameter slider of your choosing. Since they ship some models with Vltor and some with Magpul, you have choices. The triggers are mil-spec except on the M6A3, which get the most-excellent Geisselle two-stage triggers.

The LWRCI upper and lower receivers are mil-spec, but given extra attention in the finishing department, leaving the plant with either a flat-black anodizing, or flat dark earth, known in all circles other than the military as "mud color." Well, that too is subject to improvement. At the latest SHOT Show, LWRCI had new rifles on display: the anodizing met or exceeded mil-spec, but it was done in camo. That's right, Marpat, woodland, etc., are available – not painted on, but as part of the anodized finish. No, they can't re-do existing rifles. Anodizing doesn't work that way. However, future rifles will be available in camo patterns.



Despite lots of ammo, rain and no cleaning, the LWRCI rifles continued to work, even after I could not adjust the adjustable settings on the A3.



The plated carrier shows when the dust cover is open. If it bothers you, paint it. (If you can find a paint that will stick, that is.)



The railed forearm of the LWRCI rifles are a convenient place to bolt things like an Insight laser targeting designator and a GG&G bipod.

The lowers are marked around the safety with the now-ubiquitous pictograms, showing a bullet in a box with an “X” across it, a bullet in a box, and an open-ended box with the infinity symbol in it. Now, this does not mean that your semi-only LWRCI can be switched over to full-auto. Not even if you wrestled the various parts that would fit (but please don’t do that, the Feds really get grumpy when you do); no, they are just markings. In fact, the selector doesn’t even go around to the infinity symbol, it simply clicks up to the bullet in a box, which is the marking for “this thing is ready to shoot – are you sure you know what you’re doing?”

When the goodies arrived I had a fun time opening the boxes and going oooh and ahhh over the various rifles and their features. However, the real fun is in the shooting, and it is at the range that I had the most fun. I first checked them for zero, and all were plenty close enough for defensive work. Me, I like to dial things in a bit tighter, so I fussed over them at the 25 yard line, then verified at 100 yards.

The M6A1 is a very nice rifle. But I find that after all these years of being able to ignore the front sight when using scopes on a flat-top rifle, I’m done with that. So, if you are planning on using iron sights and iron sights alone, then the A1 will probably be the rifle for you. It is hard to fault the durability of the AR front sight assembly, it has after all survived nearly half a century of abuse by soldiers, airmen, Marines and even coasties. But if you are going to go with optics, do yourself a favor and go to the A2 or the A3.

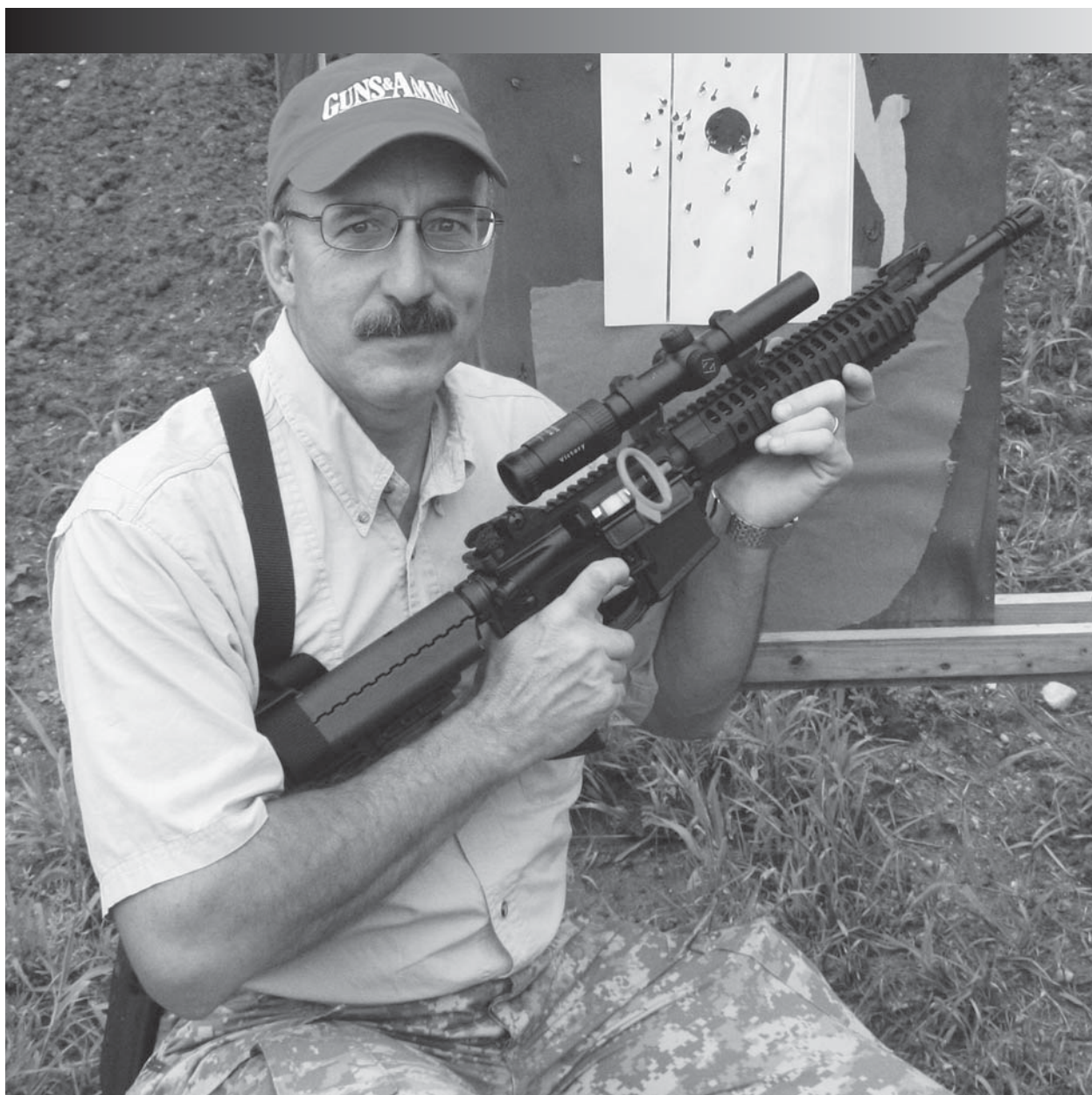
I spent most of my time with the A2. The folding sights are LWRCI-marked, but clearly Troy sights, a very good choice. The carbine is nicely balanced, although I find the railed handguard just a bit portly for my tastes. The rail covers (who invented those things?) made it entirely too fat, but once I’d pried them off, the handguard diameter was fine. With gloves it was a bit thick, but I guess I’d get used to them. If not, the LWRCI handguards are held on via a clamping arrangement over the barrel nut, so it wouldn’t be too troublesome



All ammo, all magazines – the LWRCI rifles chugged right through.



Were it raining any harder, our targets would be hammered into the mud. And still the LWRCI rifles chugged right along.



Another clean score (300-24X) for the records.

to remove them. The only obstacle I could see would be in selecting a new handguard that didn't bind on the piston. But I have not had to go to those measures, and the rifle seems to fit my hands better, the more I consider the work involved in finding a smaller replacement and then swapping things out.

In testing and doing drills, I used a prototype EOTech EXP3 and their G23 3X magnifier and found the combo fast and accurate. At close range the dot in circle design of the EOTech made fast pairs easy, and if I needed more, the 3X magnifier was easy to flip into position.

Once I'd had a chance to test the A2 and A3 a bit, I happened to run into the Zeiss reps at an industry function. They had a new and improved Victory Varipoint 1.1-4X, and I mounted that on the A3. With the two rifles to pick from, I had plenty of testing to do at range session and in classes.

I also made sure to feed the two a regular diet of steel-cased ammo, just because I have a lot of it on hand, and a lot of people seem to think that it is not really ammo. The result: no malfunctions of any kind.

I used the A3 and the Zeiss scope at a law enforcement



Everyone who borrowed the LWRCI rifles found them reliable and accurate.

carbine class, one that happened to be held during the monsoon season. We spent the week out in the rain and mud, sloshing and shooting. I also took it over to the 300 yard range and tried the 4X setting of the Zeiss on head shots, prone in the rain. (Not nearly as much fun as it sounds; the rain was turning cold by then.) Even with the rain, wind, and the dark skies, I was able to fairly regularly get three hits out of five shots on the head at 300 yards. A nicer day, or a bit more magnification, and I'd have done better, but you don't get to pick the weather. And more magnification on the top end often means more on the bottom end too, or optical problems from trying to span too much of a zoom range. The question is whether you really expect to be doing head shots, at 300 yards, with a carbine-sized 5.56. If so, go with a scope that has more than 4X on it. The Zeiss Varipoint, however,

never fogged, and the lenses didn't even get much rain that stayed on them, as the Zeiss folks use a coating that causes water to bead up and roll off.

The gas system of the A3 got green and crusty from the copper flash and the moisture, and the rings on the Zeiss got rusty, but the rifle and scope both worked just fine. With the combo, I was able to continue my string of clean scores on the patrol rifle qual course we instructors shoot in every class.

Now, do you have to buy a rifle from LWRCI in order to take advantage of their piston-driven goodness? No. They offer complete uppers, in the M6, M6A1, M6A2, M6A3 and PSD version, and in both 5.56 and 6.8, in all barrel lengths. (Obviously, you cannot purchase a short-barreled upper unless you already own a tax-stamped SBR lower.) So if you have a rifle or lower that



An LWRCI rifle, a pile of ammo, and auto-resetting targets. Oh, what a day.

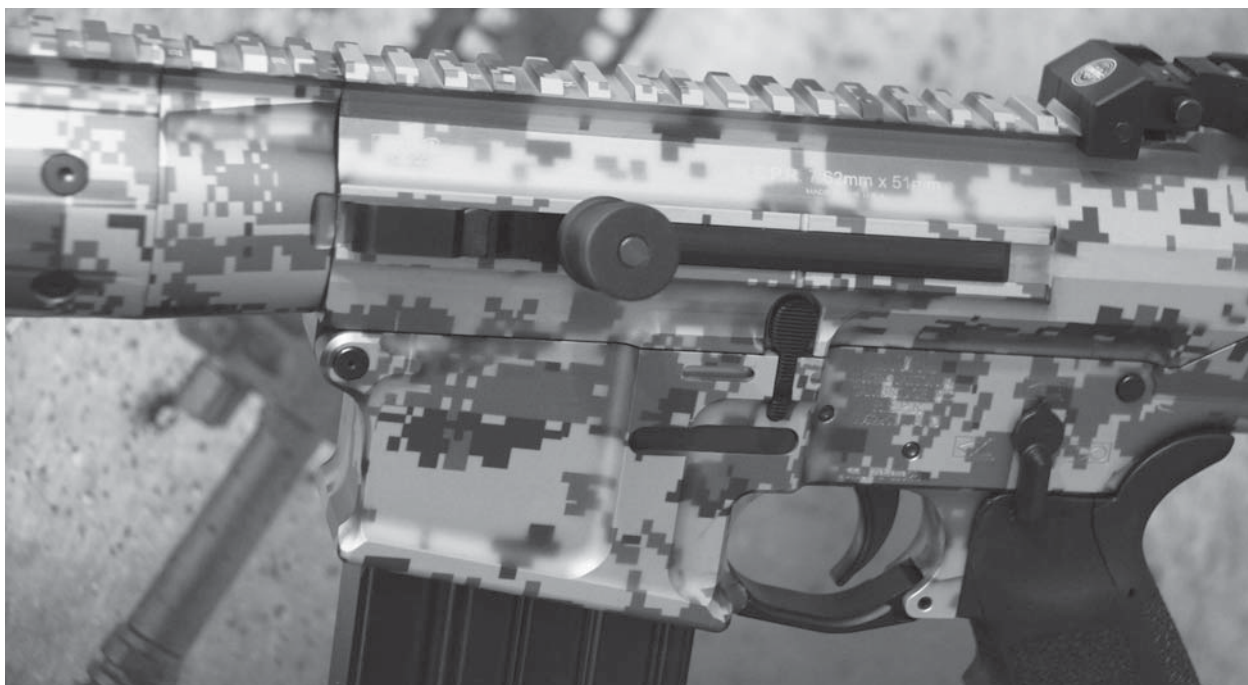
you're already satisfied with, then you can order just the upper. I'd say the best situation for that would be with a rifle you are happy with, but one in which you've finally worn out the barrel. Figure out the LWRCI upper that most closely matches the one you have, and then set up the deal; find someone at your gun club who "needs" an upper and is willing to re-barrel. Sell them the upper,

carrier, bolt, etc., and use that to finance the LWRCI upper. You should be able to get a couple of hundred bucks for your parts, and that eases the cost of buying the LWRCI upper.

Or just bite the bullet and buy a rifle. Which is what I did. I found that the A2 worked so well, was so accurate, and never failed, that broke the Cardinal Rule of Gun



One of the new LWRCI camo patterns.



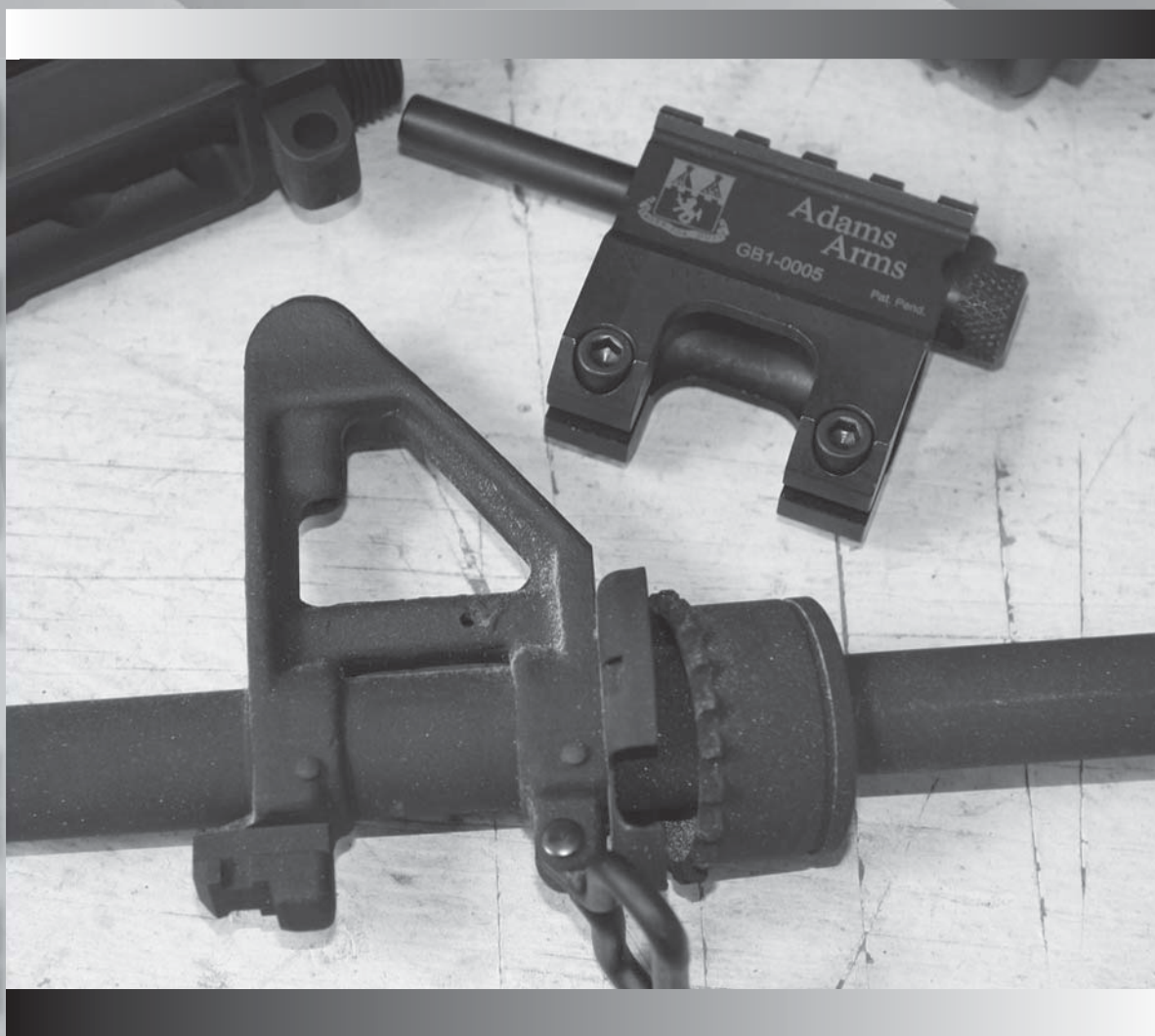
You want your LWRCI rifle in MARPAT? Just ask.

Writers: I opened up my checkbook and bought it. Of course, I have an ulterior motive; I can now shoot it until I wear the barrel out and see just how long that takes. I'm not sure that LWRCI would be willing to send me a rifle on loan for a few years, knowing I was going to shoot it until the barrel was toast.

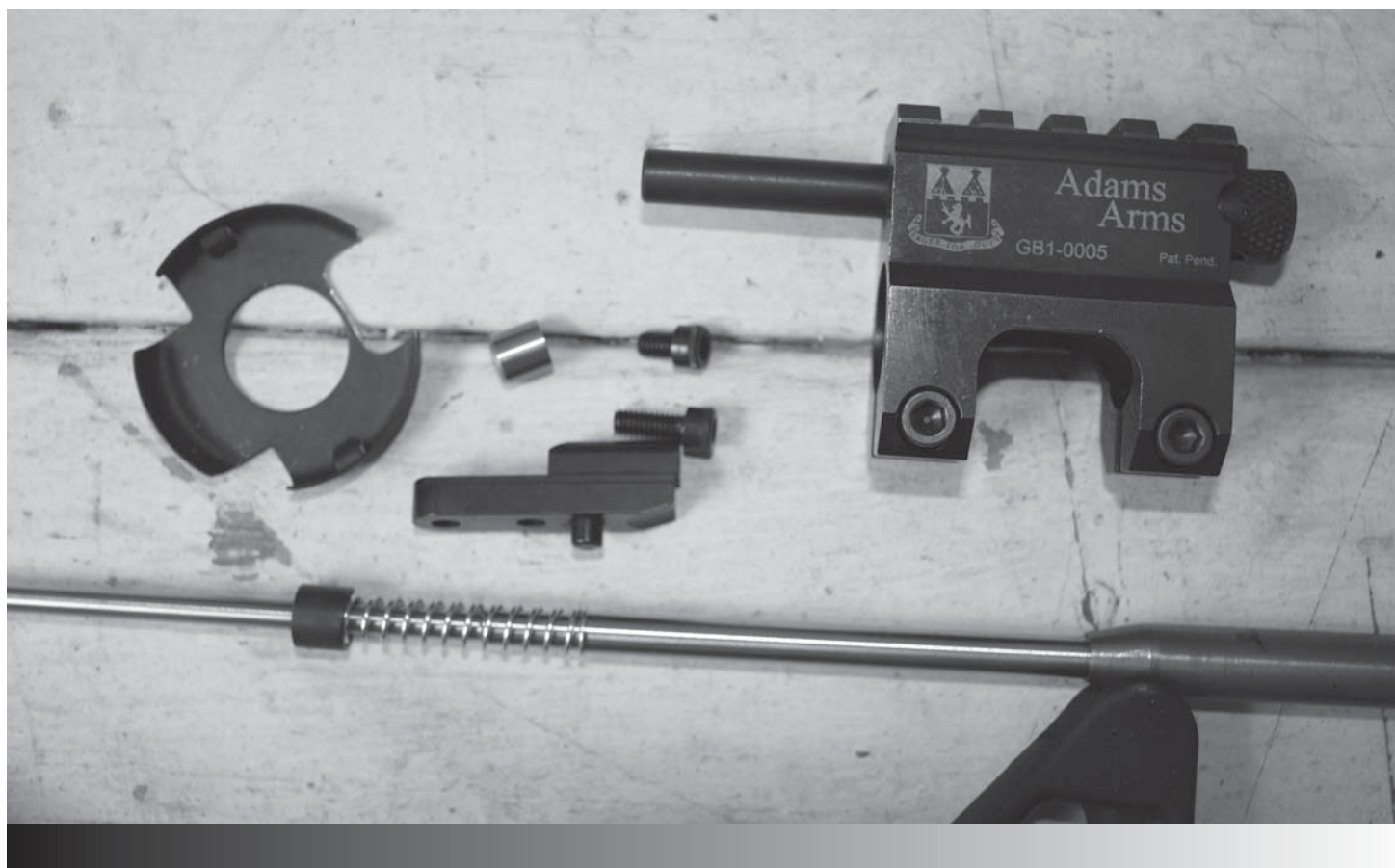
Having jumped in early, however, I'm not going to be able to get the camo'd anodizing treatment. I guess I'll just have to figure out a cool paint job as an alternative.

THE ADAMS ARMS PISTON CONVERSION

CHAPTER 5



The Adams Arms conversion replaces your existing front sight tower/gas block. Be sure that's what you want to do before you jump into pistonland.



Everything you need for the conversion that isn't a standard tool, is in the kit.

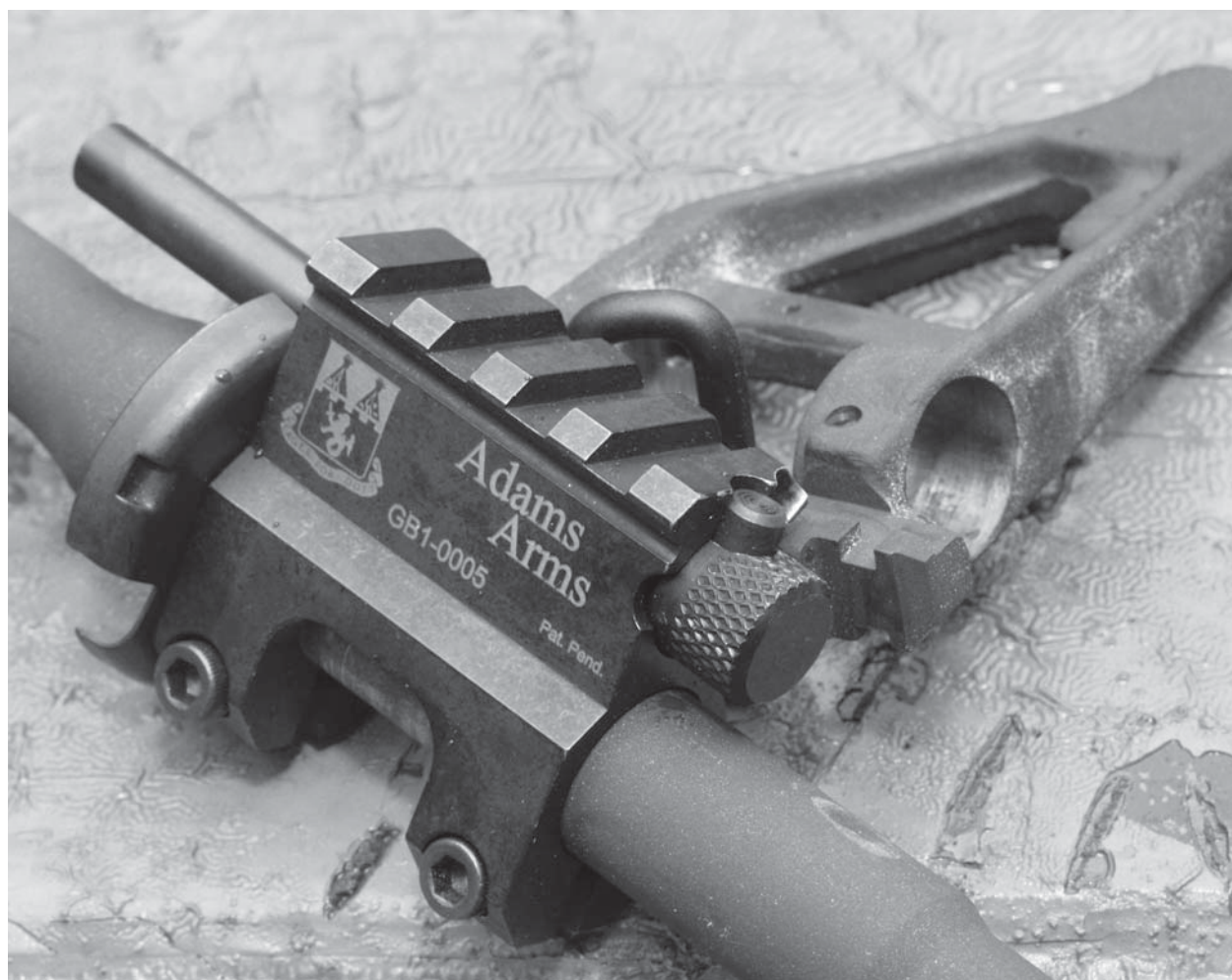
The Adams Arms piston system is one of the first successful conversion systems, and the very earliest were learning experiences, both for the makers and the users. Not that the earliest ones were bad, mind you, but everyone involved quickly figured out what they wanted, what they were happy with, and what would work to everyone's satisfaction. Which is, after all, the very hallmark of a free-market system.

Mine is one of the first Adams Arms conversions available, and so I'll use it as the starting position and bring you up to speed on things as they changed. The Adams is a short-stroke venting system, with a piston return spring and an adjustable gas regulator. You have full, restricted and off. They are for regular, suppressor, and no-cycle applications.

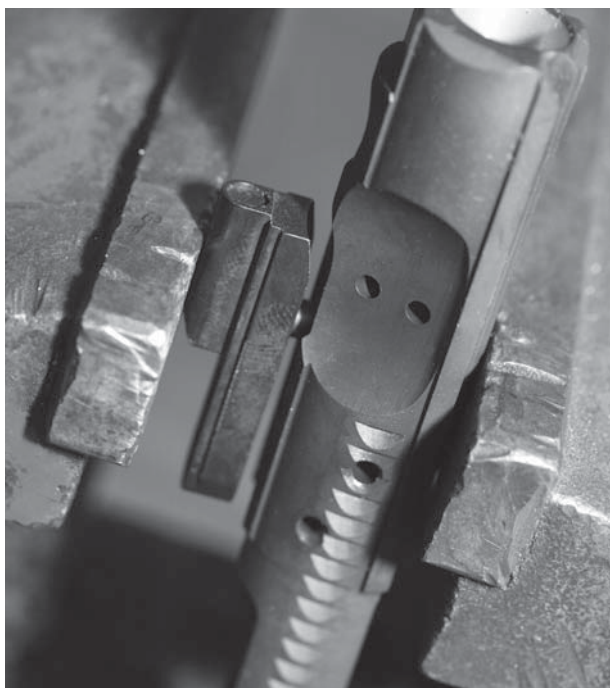
The gas block clamps onto the barrel in place of the regular front sight housing. The block has a rail on top, so you can mount a front sight if you wish, or you can leave it alone and put the front sight on your railed forearm, since everyone has a railed forearm these days. The piston uses a pair of guides to keep it in line. One is the barrel nut, where a cup rests on the barrel nut, the cup being the location for the piston return spring, as well as working to keep the piston in the spline of the barrel nut. Since one of the guides is the barrel nut spline, you have to have a barrel nut that is clocked-up precisely and does not work loose. The second is a sleeve you have to press into place in your upper receiver. The piston enters the receiver at the gas tube hole, and it didn't take much use early in the design process to



The original conversions used a replacement thrust shoulder that went onto your carrier. Current conversions have a new carrier. I've never felt the need to upgrade.



Here is the replacement gas block, on the barrel. Take care to get it upright.



Here is the replacement thrust shoulder being pressed into the carrier. Today, you need not do this.

While it looks like the thrust shoulder is held on by the screws, they do not take the load of the piston. In case you ever look at buying an old conversion, you'll want to know these details.

determine that the small aluminum tabs in the upper, which are sufficient to keep the gas tube centered, were not enough for a moving piston.

So, in installing the Adams conversion, you'll have to press the sleeve in place. It is not as simple as "pressing" it in, but rather using the provided tool to drive it home with a hammer. A suggestion at this point, if you are considering the Adams or another conversion system: if you are going to be installing things like guide sleeves, clean the upper. As in, scrape out all the accumulated carbon that is in the upper, degrease it and scrape some more. If you don't, whatever is left in there will cause problems. Also, when installing the system, remove the gas rings from your bolt and install the supplied spring



The Adams Arms conversion, on the barrel, before handguards go on.

behind the bolt. The spring addresses potential cam pin wear. Me, I figure the old system didn't need it, and if mine ever falls out in cleaning I won't sweat it. But that's just me, and you should follow the manufacturer's advice and directions.

On the earliest conversions, the Adams parts kit also included a thrust shoulder you installed on your carrier to replace the gas key.

This was not what the piston-conversion public wanted, even though Jason Adams had figured out a very clever and solid means of attaching a thrust shoulder to existing carriers. What he did was simple: instead of depending on a pair of screws to hold against the impact (the method most early designs tried) he built a replacement thrust shoulder that was held on by those two screws, but used a stud on the bottom that you pressed into the gas-flow hole in the carrier. So, instead of a pair of relatively soft screws that were not tightly butted up against the impact, you had a solid steel (and harder steel than key screws are made of) stud, pressed hydraulically or using a bench vise, into the carrier steel.

I have that conversion on one of my rifles, and I've used it for a couple of years now, in classes and matches, in good weather and bad, and it has not failed. But the piston-buying public wanted integral thrust shoulders on

a carrier, so that's what Jason went with.

The new conversions (Pistol/PWD, Carbine, Mid-length and Rifle) each come with a new carrier, and in switching your rifle over, you remove your bolt from the old carrier and plug it into the new carrier. The kit comes with the new gas block and carrier, piston, spring and cup, guide sleeve, and the guide sleeve installation tool.

As the first successful one, the Adams Arms conversion has had a number of competitors and imitators. It has, however, been quite successful in that it works like a champ, and mine has never failed me, even when I've tried to make it quit.

I installed mine on a chrome-lined 16-inch M4-profile barrel from Bushmaster. (The new gas block is made for barrels that are .750-inch in diameter at the gas port location.) It was a snap to get it installed, although in all fairness I have built many ARs through the years. (More on conversion installations in a later chapter.)

The lower is a CMMG I had on hand, ready for this project. The upper, an M4 flat-top. As I mentioned, the barrel came from Bushmaster, and the bolt and carrier are Stag Arms parts. In other words, this rifle is a perfect demonstration of the modular nature of the AR-15. None of these parts came from the same manufacturer, and



The CASV-CL is a perfect place for an Aimpoint and magnifier, making the Adams-equipped carbine an easy 300-meter tool.

yet they all worked together just fine. For handguards, to start with, I simply used the modified M4 handguards that Adams had included in the kit. Once it was all together (and that took perhaps an hour at the workbench, taking photos as I went) I tested it, and found it to be entirely satisfactory. Well, it was satisfactory for a few range sessions, and then I had to change it. What can I say, I have the “gunsmith’s disease” and I have it really badly. I can’t look at a pile of spare parts, or a new gizmo, lying on the bench, and not think of assembling them. So, I looked into the parts drawers and came up with a prize I’d been meaning to install for a while: an Vltor CASV-CL handguard.

So, off came the handguards, the gas block and the handguard retaining gear (“C” clip, spring, delta ring) and back on when the gas block, followed by the CASV-CL. The Vltor CASV series are handguards made of aluminum stampings. Rather than mill aluminum blocks, Vltor (the retail division of an aerospace

contractor) stamps them. Not thin, tinny, easy-to-mangle aluminum stampings, but robust ones, with internal stiffeners welded to the *monocoque* shell. (Now there’s a word I’ve been dying to use in a firearm context. Thank you, Vltor.)

The CASV-CL provides a lot of surface area for grasping, and also bolt-on location if you wanted to add rails. The top rail extends the length of the handguard and aligns with the receiver, so if you need lots of rail-estate, you have it. It also provides lots of cooling air flow, and you can easily see the piston, return spring and its seating bushing inside the rail.

As this was the first piston system I had to test, I have to confess that I abused it mightily. Yes, you can get twigs, branches, brush and leaves inside the CASV-CL handguard. And if they get there, you can easily fish them out. But even with the handguard fouled with vegetation, the Adams conversion worked fine. I tried it with excess lube, without any lube, in the rain,



One aspect of mixing and matching parts is that you sometimes run into conflicts. I haven't the heart to mill my Vltor handguard, so I simply mounted the front sight backwards.

snow and cold, in blasting heat, and all the while the rifle just perked along. I fed it a case of Wolf steel-cased ammo, looking for problems to no avail. That is, it did not fail. I did encounter one slight problem: a front sight. I found that the Midwest Industries sight I had at hand was best installed backwards. Otherwise, it wouldn't fold. This is a problem you'll have with any and all

piston conversions: the gas block and associated parts take up a certain amount of room. If you try to use a handguard designed for another application, you may have dimensional disagreements.

Adams provides a list of handguards that do and don't work with their system. If you have, or want to have, a particular handguard, you should consult the list. Some



handguards can be modified to fit. Others, due to their design, can't be modified, and any attempt to do so will simply carve off an essential part of the handguards. Think about this, and follow the old machinist's adage: measure twice, cut once. If you attempt to alter the Adams conversion, or someone's handguard to make the two work, and fail, you will get no sympathy. Not from



My Adams rests under a Vltor CASV-CL. There is plenty of room for heat to vent and debris to find its way out.

me, Adams, or the handguard manufacturer. Sweeney's Warranty Rule applies here; "Hammer marks and tire tracks void all warranties." Not to mention dremel scars.

The Adams gas block has four setting locations for the spring-loaded plunger. Three are operational and one is disassembly. Straight up is normal, tipped to the left (from the shooter's end of things) is the suppressor setting, all the way left is gas shut off, and back the other way all to the right is the disassembly setting. Turn the knob to there, and you can pull it out the front. Well, you can if you've kept it clean and done so on a regular basis. If you haven't, well, you'll have a rollicking good time soaking it with penetrating oil and wrestling with padded pliers to squirm it out. (You know how I know that.) Just press the button into the knob, and turn.

Even neglecting lubrication, and letting it get crusty and (the horror!) a bit rusty from the rain, it has never failed to function. So, if you want to go piston, this is a good choice.

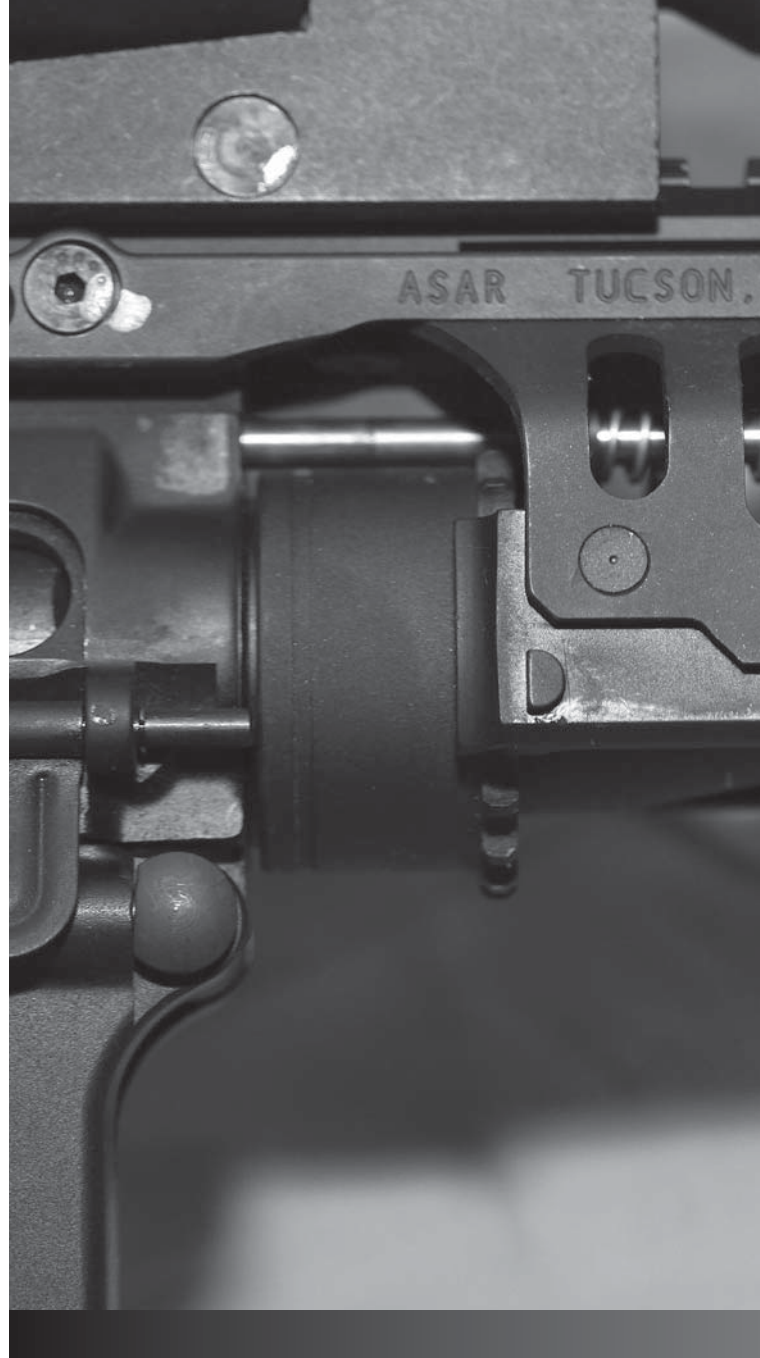
When you peruse the Adams web page or literature and see the price, remember that you're buying a new



The Adams has regular and low settings, and the adjustment knob comes out for cleaning.

carrier in the kit. That means you'll have a spare carrier when you're done. So, if you want to, you can either use the old carrier as a basis for building a new rifle ("Hey, I've got enough parts in here to build a rifle!") or you can sell your carrier to one of your gun club buddies, to cover the down payment on your new piston system. A carrier with key runs about \$75 these days, new. You should be able to get \$50 for your used one, unless you've done something unmentionable to it.

You can, if you are good with machine tools, modify some handguards that would not otherwise work with the Adams Arms conversion, and make them work. Also, the front sight rail, on the new gas/piston block, is the same height as the top rail of the upper receiver. So any front sight that is designed to go on a railed forearm will work on the Adams, provided there is clearance with your handguards. (This is where most modified handguards run afoul of the system and your desires.) Oh, and if you do make modifications to the Adams



system, be aware: the gas block and various parts are given a melonite surface treatment. That means they are harder than sin, and you might find you've simply beaten the cutting edges on your tooling to flinders, all for naught.

As conversion systems go, the Adams is one that falls well within the boundaries of "user serviceable." If you have any facility at all with tools and the AR, you will be able to convert your rifle to an Adams piston system. The Adams, since it was the first, also taught me some of the



The lower part of the handguard detaches if I want to mount something like an M203 there. If I do, the Adams piston won't notice.

drawbacks to the piston system. Early on, I discovered (and this is not unique to Adams; it is inherent in all piston systems) that shooting a bunch of ammo and letting my left hand stray to the gas block, was an invitation to blisters. As in “[blank!] that’s hot.” Also, if I shot as some 3-gunners do, with my left arm almost straight, the venting gases would scorch a black patch on my fingers where the system was venting on each shot. So, keep your hands inside the vehicle at all times and do not feed the animals.

Also, do not let your new railed handguard contact the gas block, or it will act as a heat conduit. Now, you wouldn’t want there to be contact there anyway, as it would be bad for accuracy. But losing accuracy and gaining blisters is a particularly bad arrangement.

Take reasonable care in converting your rifle, and your Adams piston system will serve you well.

CHAPTER 6

THE STAG ARMS M8



Stag makes uppers and complete rifles. This particular one is the M8, their piston-driven carbine, right-handed.



The gas block is pinned to the barrel, and the Midwest Industries front sight is ready to go.

A few years ago, Stag Arms was unknown. Well, unknown to the retail-buying AR public, but inside the secret society of gun makers and writers they were well known in their older form as a big-deal military contractor. At any rate the big company, owned by the father, was.

To do retail, Mark Malkowski formed another company, and using the main company manufacturing facilities as a jumping-off point, he proceeded to carve out a big swath of the AR market. You know Stag from their logo on the side of the lower receiver; an adult male deer, complete with impressive rack. Now in some circles, the idea of having a deer head on the side of one's tactical rifle is anathema. When I heard that, I was struck speechless, and you have to know me to realize

just how impressive a feat that was. Now, if you want something more “impressive” or “more deadly” on the side of your rifle, fine. Find a manufacturer who will do polar bears, king cobras, scorpions, or a profile of Nancy Pelosi. Me, I don't care if a rifle has pandas, penguins, cuddly puppies or flowers on the side. I want something that is reliable, accurate and durable. Make mine with a deer on it.

Oh, and for those who were wondering just how it was that Stag got into the left-handed AR business? Simple: Mark is left-handed, and he finally got tired of getting brass and gas blasted into his face while shooting the product he made. Rather than do an ugly cobbled-together left-handed AR, he reversed the drawings, had new forgings made, and produced an elegant left-handed



The system is self-venting, and once the piston head has traveled far enough, excess gases are blown out into the air. Don't get a finger there, or mount gear there.



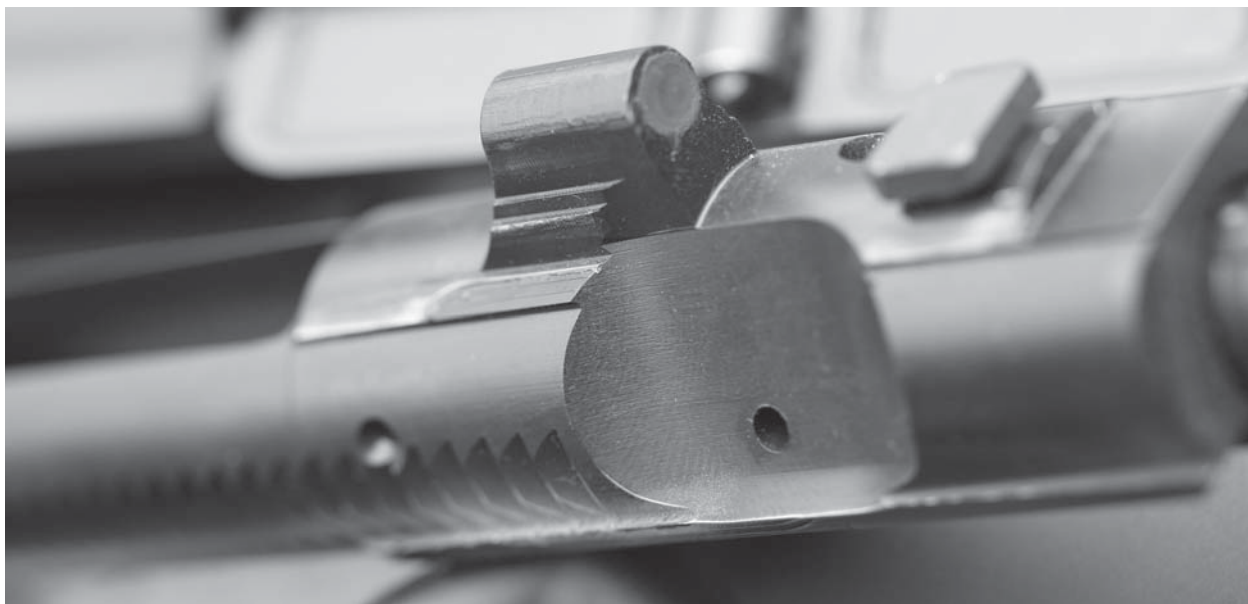
The piston and its guide tube, which is attached to the gas block.

AR. But that isn't the subject of our interest here; the piston gun is.

As a modern manufacturing facility, Stag does not do every step in-house. Small springs, pins, parts that can be made by a sub-contractor (but made to mil-spec, and inspected thoroughly by Stag on arrival) are made "outside." What matters, what is important, is made in-

house. Stag receives forgings for uppers and lowers and machines them to precise and final dimension before sending them off to be anodized. Forging and anodizing, the beginning and ending of the making of uppers and lowers, are both specialized endeavors, and best left to those who do those, and those alone.

I had an interesting moment at one point in the



The carrier has an integral thrust shoulder machined into it.



The carrier has anti-tilt pads on the rear. Originally they planned to nickel-plate the carrier, but everything chipped, so they went back to good old parkerizing.

tour. As a legal and manufacturing step, the question of “when to apply the serial number” comes up when designing a manufacturing process flow. It has to; it should be considered essential in any efficient operation. If you apply it at the very start and then have a problem and end up scrapping a lower, then you have to deal with a scrapped, serial-numbered part. If you wait until the end, you have the dual headache of 1) lowers lacking numbers coming to the end of the manufacturing

process, and 2) the delicacy of the AR lower. If you try to stamp a serial number onto a lower, once machined, and you don’t support it from the inside, you’ll scrap a whole lot of them.

So, Stag serial numbers forgings and has built a special transport system and packaging method to mark them both quickly and efficiently. As I’m looking on with glee at the system, I realize that the boxes surrounding me are the same boxes disgorging the forgings I’m watching. I do a full turn, and realize that the building I’m in is stacked to the ceiling with large cardboard shipping boxes, each filled with forgings. I do a quick bit of arithmetic, and catch my breath; I’m looking at enough forgings to keep some of the second-volume AR makers busy from one presidential election to the next. That’s the kind of volume Stag is accustomed to.

The numbered, then machined and anodized lowers travel into two shipping streams: one for assembly in-house, and the other for eventual retail sale. Stag took that extra step and had boxes made and printed for use in shipping the individual lowers. Now, I’ve had some gun-show commandos extol their knowledge of things AR by saying, “You want to buy a complete rifle, because the rejects get sold as bare lowers.” The first time I heard that, I almost snorted coffee through my nose. At all

the top makers, not just Stag, reject lowers get scrapped, not sold as bare lowers. As for sorting them into “retail” and “build” categories, there just isn’t time and room. The volume of lowers traveling past each employee is so large, there is time only for inspection and the decision “Pass inspection? Hand it on. Doesn’t? Into the bin.”

Stag machines many of the components for an AR, and does so to mil-spec standards. Uppers and lowers are supposed to be forgings. In some makers, the extractors are castings, and bolts are machined from an easier-to-machine steel alloy but one fully capable of standing up to the workload. At Stag, extractors are machined from heat-treated steel that arrives in billets (and is thoroughly tested and inspected on arrival) and bolts are machined from mil-spec alloy, and given mil-spec heat treatment and testing. All this is done on CNC machining centers, with the exception of a very few, highly-specialized

operations that can be best done on a single machine.

At one point I turned a corner and came face-to-face (if machines have faces) with a hulking big Bridgeport mill. The Bridgeport company, based in Bridgeport, CT, began production of a perfected milling machine, one that offered versatility, power, precision and ease of use, just before the onset of WWII. Shortly after, with the need for wartime production growing greater every day, Bridgeport made a huge number of these machines, and improved the design. After the war, the immense American production capacity was enabled, in part, by these machines. Post-war, if you were a machinist, it was assumed you knew how to run a Bridgeport. If you couldn’t, there was something deficient in your training. When gunsmiths get together, they talk guns and tooling. “He has a Bridgeport” is not just a sign of status, but of someone who has arrived.



The gas system, with the piston and its return spring, and the retaining nut.



A Stag receiver, ready for shipping. You get the same top-quality parts, whether as parts or assembled firearms.

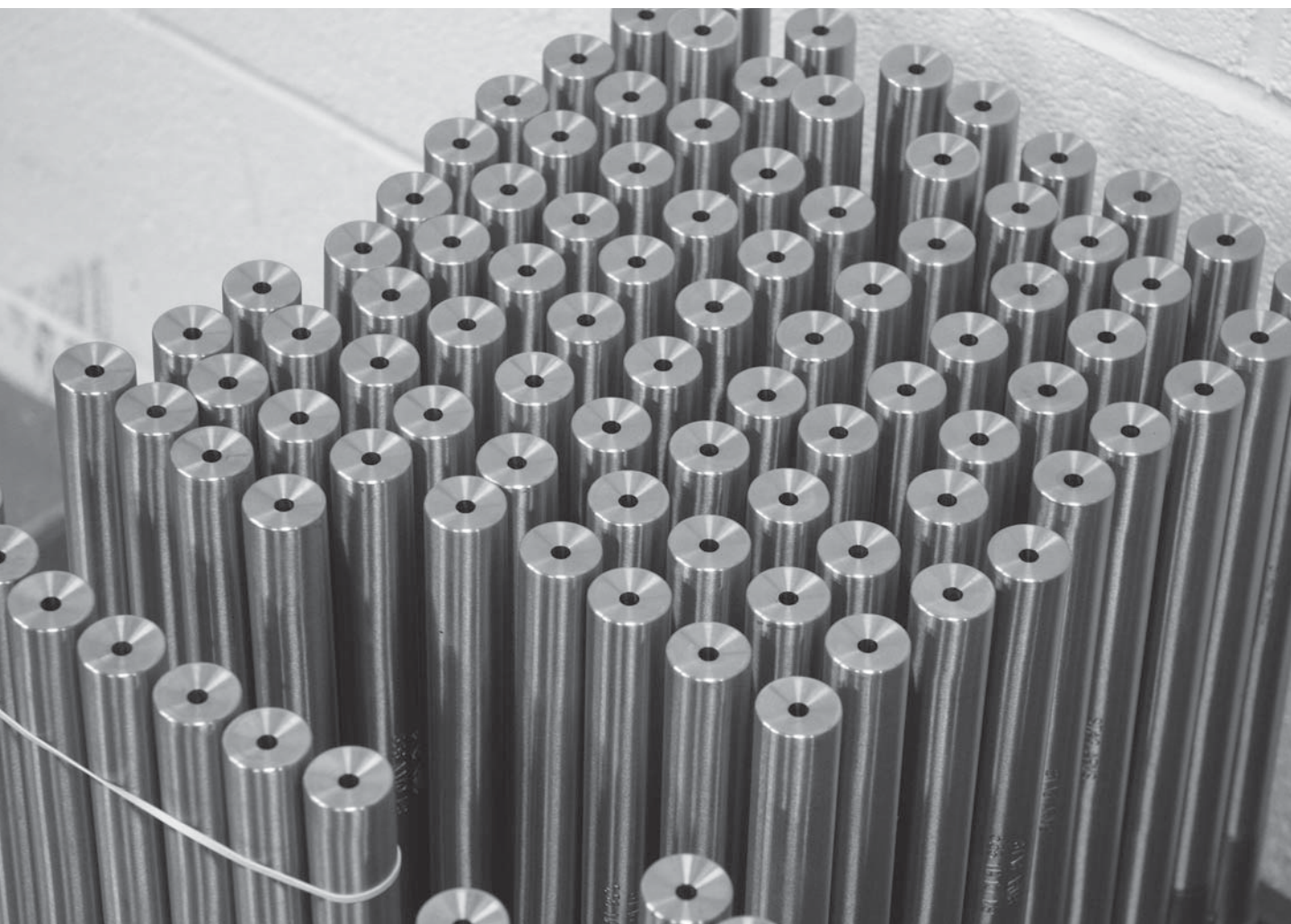
My guide, seeing the smile on my face remarked, “Yes, they were pretty easy to buy when Remington closed the plant.” “So, did you bid on machines, or just buy them by the pound?” “Something like that.”

Stag machines their own barrels from barrel blanks, and they are chrome-lined, parkerized (except for the match bull barrel) and have a twist of 1:9 (again, except for the match bull, which has a 1:8 twist). Why that twist? The “mil-spec or bust” crowd would have you believe that any barrel that wasn’t given a twist of 1:7 is obviously defective. Stag recognizes that most of their customers will not be using cartons of Mk 262 Mod 1 ammo (and at \$750 a case, who but the government could?) to plink with, and if you aren’t using 75- or 77-

grain bullets, a 1:9 twist fully stabilizes everything else.

That visit was when I saw the Stag piston gun. They were still in parts, working their way through production and assembly, but clearly piston guns. We discussed the various features, and I was sworn to secrecy. No problem. Now that the rifle is available, I can tell you all about it.

The Stag piston system is a short-stroke dual-piston venting system, with a replacement gas block out on the barrel. Rather than try to bolt something onto the existing AR front sight, Stag went with a new block, pinned to the barrel, and then went from there. While the bottom of the new gas block is railed, in case you want to put a light there, it does not have a bayonet lug.



Finished heavy match barrels, ready to be installed in varmint-vaporizing Stag rifles.

Which is fine by me, as I do not anticipate ever needing a fixed bayonet. Now, if I'm wrong in that assessment, and I end up at the Pearly Gates, where The Man asks me "don't you wish you'd had a bayonet?" – yes, I'll be embarrassed. But I figure when it finally comes down to the dilemma, I'll have had a lot of intermediate steps between "rifle with bullets" and "a bayonet on muzzle" to try and solve my problem.

If you absolutely have to have a bayonet, the first problem will be one that works with a 16-inch barrel instead of the 14.5-inch on an M4. But that will be your problem, not mine.



Left-handed? Stag does that, and better than anyone else. This is a bin of left-handed (and so marked) carriers.



Stag-machined extruders, halfway to becoming Stag parts. Yes, they do all the important stuff in-house.

The Stag M8 comes with plain old plastic/polymer M4 handguards. The guys at Stag are very pragmatic. They figure that most end-users are either going to be happy with plain old M4 handguards, or they will have some specialized set of railed handguards that they simply must have. Rather than put on something else (and the railed handguard crowd has dozens to choose from) and have the customer go to the effort of having to take it off, Stag simply goes with the basic handguards and lets you go to town yourself. Which most of you will, I'd wager.

The gas block comes with a Midwest Industries folding front sight in place, while the rear sight is a low-profile MI sight, both of which lock upright when flipped for use. Locking sights is an Airborne requirement, where the need for folding sights (ones that won't gouge a hole in a landing jumper) but which lock upright and won't get inadvertently folded down (hard to aim a sight that is halfway between up and down) is an obvious job requirement.

The front of the block has the gas plug, which is adjustable for full or partial gas flow, just in case you



A box of barrels, profiled, parkerized and ready to get the gas block they need.

are running a suppressor on your M8. It is also the disassembly bolt, which, when you unscrew it, allows you to remove the piston. In operations, the gas flows into the gas block and raps the head of the piston. The piston moves to the rear, which after traveling about an inch vents excess gas as it cycles. The piston is spring-loaded and guided by its guide tube, and returns forward once it has driven the carrier. If you have optics or accessories mounted up front (on the railed forearm you just had to install) then it will get some gas splatter. No way to avoid it, the gas has to go someplace. Don't blame Stag for your carboned-up laser designator, you shoulda thought of that before you bolted it on up there.

And not to blame Stag, this is a minor problem with all venting piston systems. That gas has to go somewhere

and if you mount something "right there" it is going to get scorched. As I mentioned earlier, your hands can be scorched too, so stay clear of the vent area. A couple of magazines of shooting will show you where it is.

The carrier is a new design, with an integral thrust shoulder machined into it. When the M8 was being developed, Stag considered plating the carrier. In fact, the early promotional info clearly stated that it was a plated carrier. However, in testing Stag found that the plating chipped. Regardless of what kind of nickel plating they plated it with, it chipped after enough use. (That right there should tell you something: Stag tested this enough before going into production to find out the plating chipped at a rate they didn't like. Nice to know they do that much work first.)



A fully-machined lower, ready to be sent off to the anodizing shop.

The carrier has other changes, too. It has anti-tilt pads on the rear, and the back end of the carrier has a hole drilled crossways through it. Were I shooting NRA High Power and felt the need for a heavier bolt, that would be perfect as a place to cross-pin in a cylinder of steel. Or if I wanted to add mass for a caliber change, more of the same. Also, the carrier has a spring in it to tension the bolt forward, as you'll notice when you take the rifle apart. My thought, on seeing that, was to consider bolt alignment: rather than simply depend on the internal track of the upper to keep the carrier key aligned, the spring keeps the bolt pressed forward, aligned and ready to feed and close in the barrel extension. Well, it does that, but in talking with Mark, I found it also has another task: it regulates bolt speed.

The bolt does not have gas rings (doesn't need them, no gas) and the lack of friction means the bolt opens faster. Now, Stag could have simply left the gas rings in, but rings wear. As they wear, the friction would change. A spring changes less over time and use than the rings would, and does a better job of regulating bolt opening as well. (I have to wonder how much high-speed video it took to figure that out. Part of the R&D budget that no manufacturer likes to discuss, so their competitors won't get a leg up.)

The rest of the rifle, the lower, is a standard M4gery. After all, the lower doesn't have to have any changes to accommodate a piston system, so why go screwing around down there? As a result, Stag can also offer piston-built conversion uppers, or at least will do so

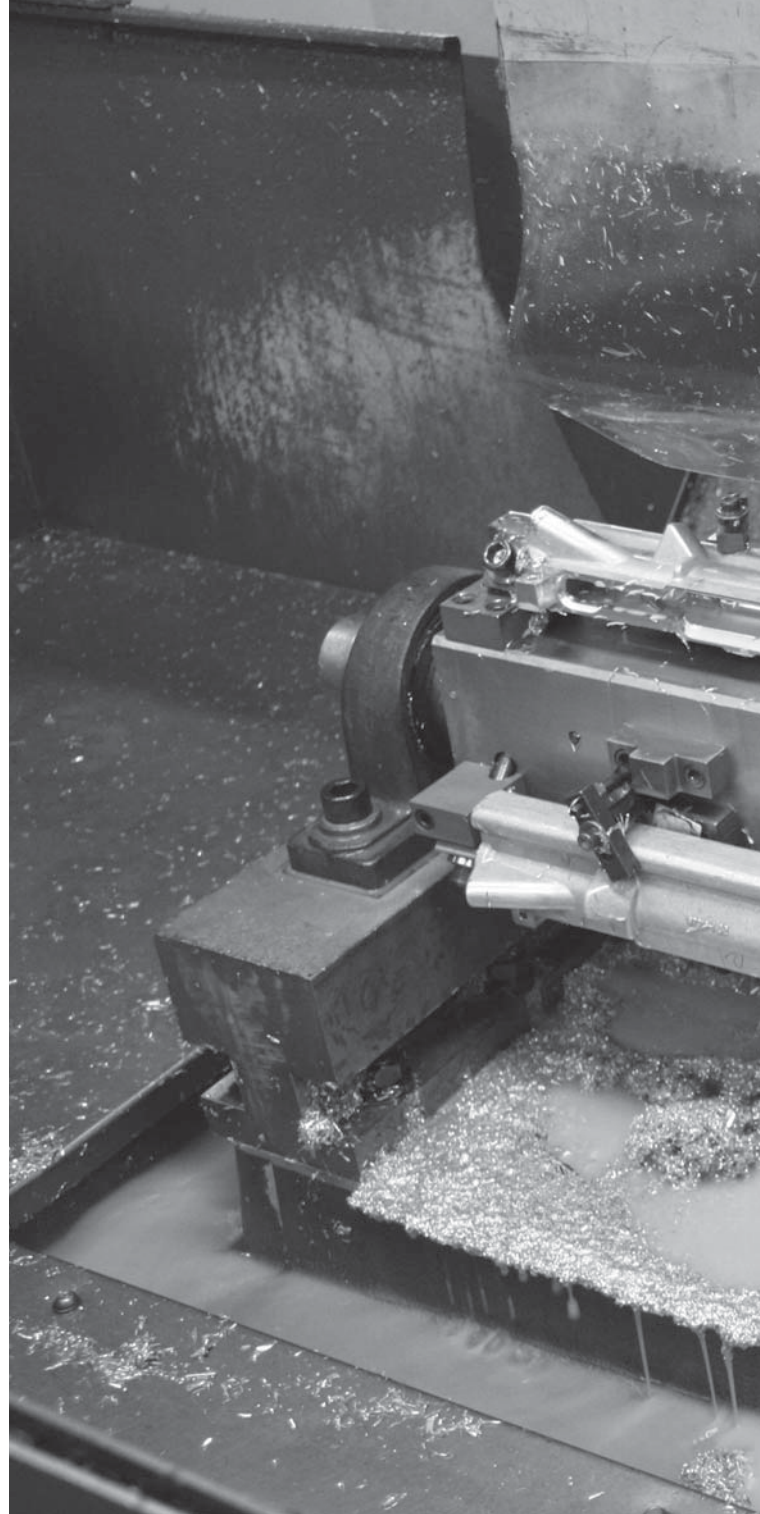


Stag makes their own bolts. Here is one step in the process.

once the production of complete rifles catches up with demand.

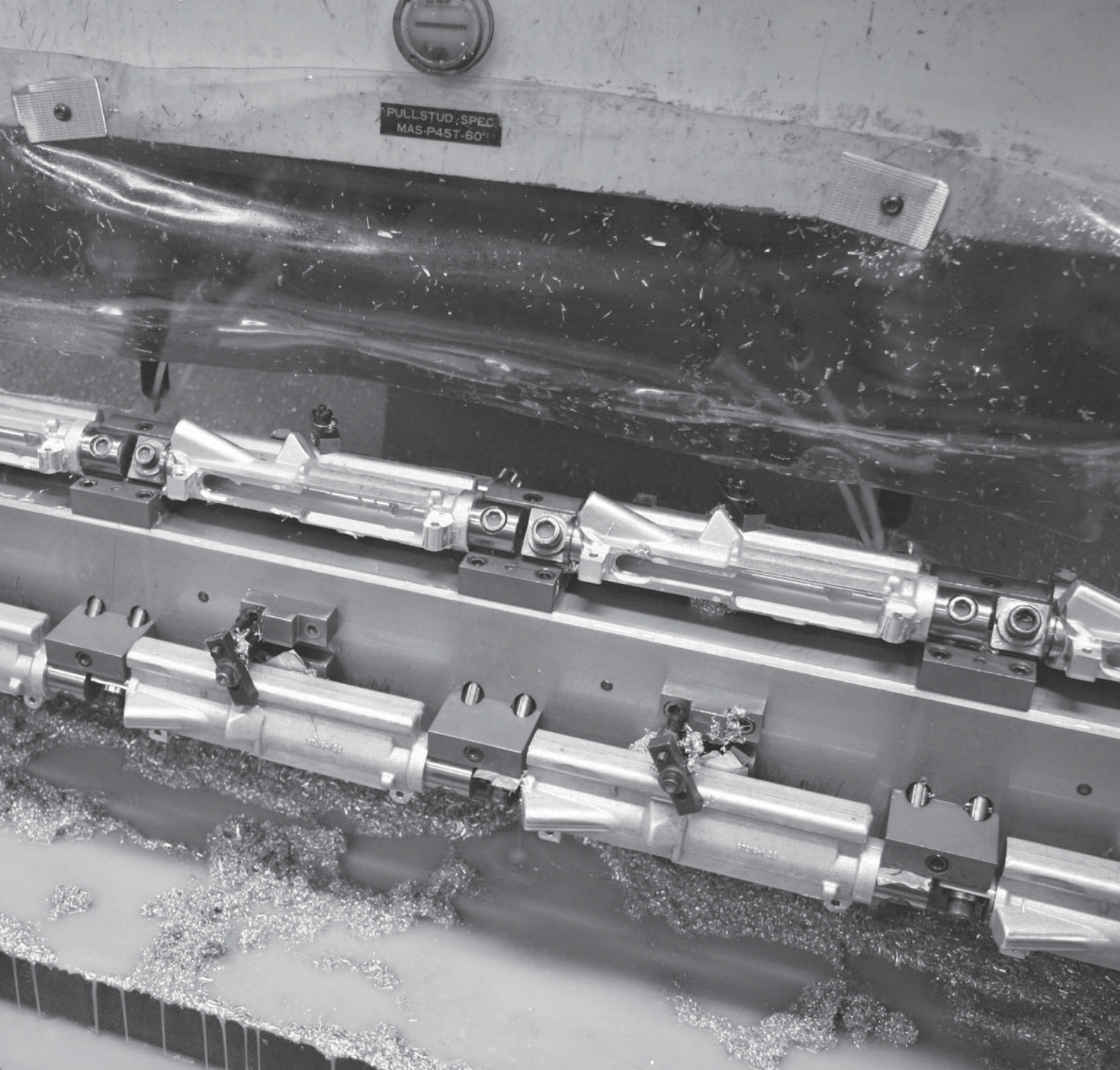
How is the Stag M8? Well, not to sound underwhelmed or anything, pretty much like all the other Stag rifles I've shot. The piston system is lightweight and reliable, and the recoil impulse is not a whole lot different from a DI gun. It was a piece of cake to hammer through drills, and as for accuracy, it passed the basic test; I shot clean on the NEMRT Qual course, and judging from my success on the 100-yard falling plates (roughly the size and shape of bowling pins) I'll have no problems shooting clean on the 300-meter pop-ups at the NG base, next time I'm teaching a class.

I did notice that the gases puff up right behind the front sight. However, the conditions were perfect for noticing the event; it was bitterly cold but as humid as only a winter day in the Great Lakes region can be. There was no wind, and the sun was low and behind me. Combine all that with my lizard-like no-blinking-while-shooting eyes, and I could see the puff of gas if I



cared to focus on it. Remove any of those, and the gas would never be seen.

We come again to the question of the day: do you need a piston-equipped AR? Maybe yes, maybe no, but if you do, the Stag M8 should be on your list for consideration. Will Stag make it in left-handed



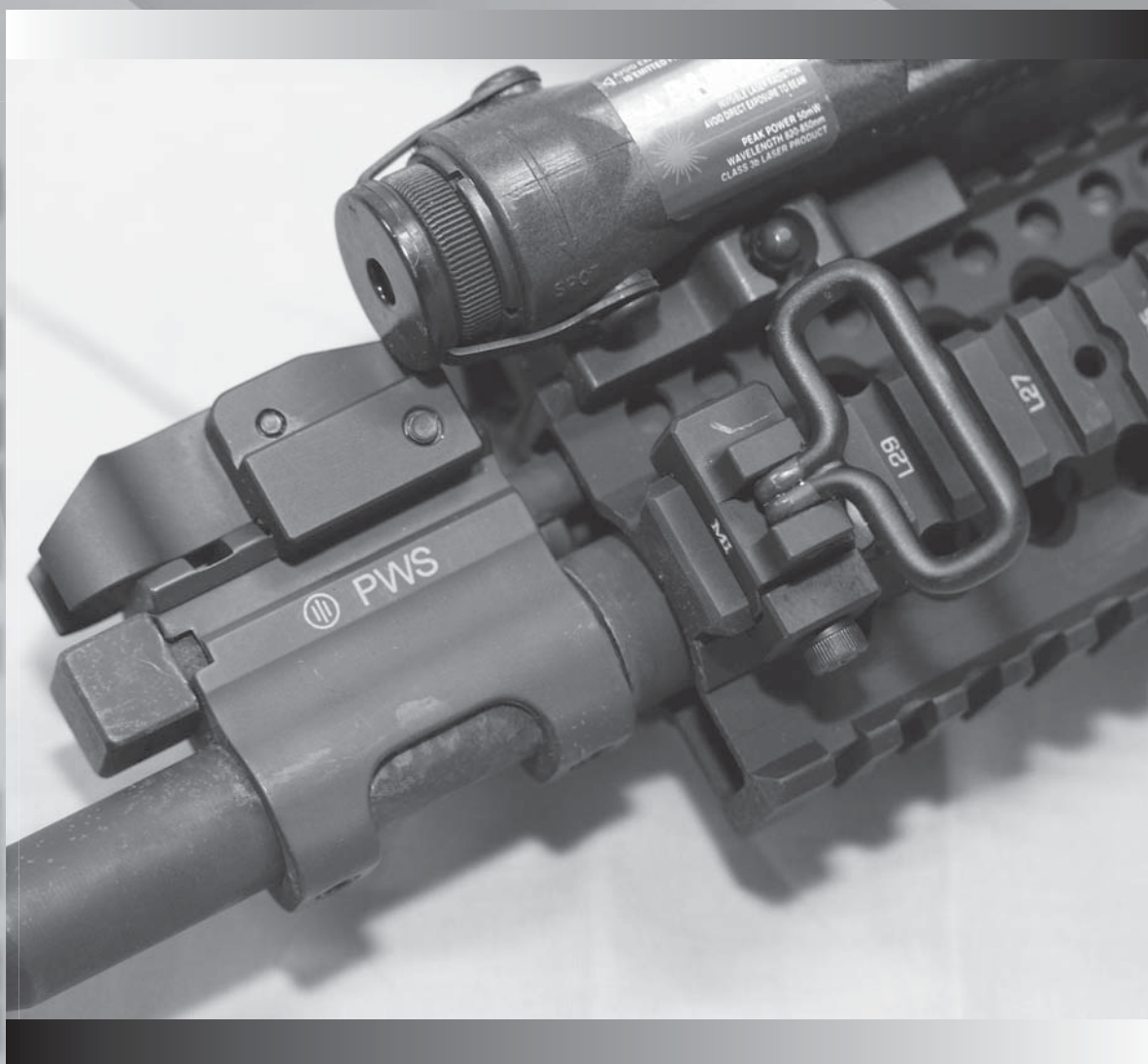
Flat-top uppers, taking turns under the cutting tools of the Stag machinery.

models? An interesting question. The piston itself doesn't care, as it has no "handedness" in its design. But Stag would need to make a left-handed piston carrier and a left-handed bolt. (The bolt appears to simply be a standard bolt, so the left-handed ones they make would probably do.)

The easy answer: I asked Mark if they would be making a left-handed M8 piston-driven gun, and his reply was, "We're already working on it."

CHAPTER 7

THE PWS



The PWS conversion replaces your front sight/gas block, so be ready to put a folding front sight on when you get it back.



The front block has a latch, and you can remove the front gas system block for cleaning.

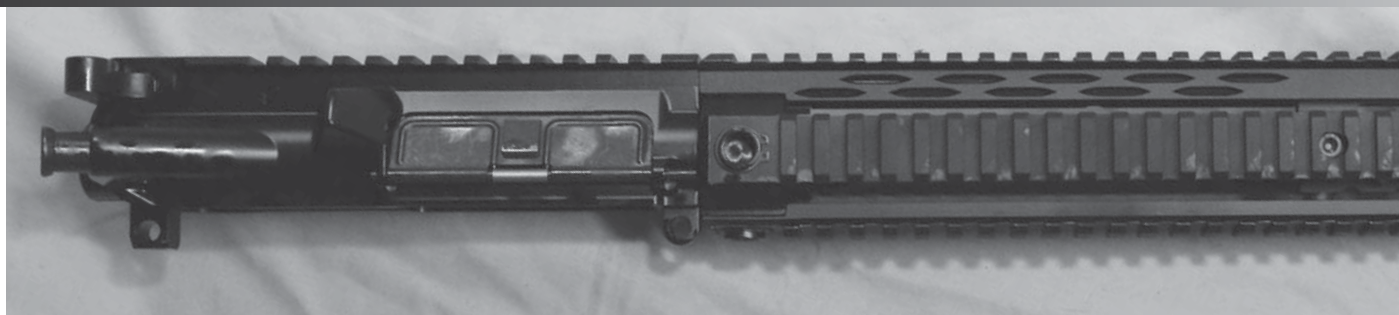
The Primary Weapon System piston design is the only long-stroke piston being used in an AR-15. The piston is attached to the carrier directly, and extends all the way to the gas block, at the front sight. On the early systems, the piston was just a straight rod, while later ones have what you'd call a piston head. It is attached to the carrier at the gas key location and bolted down. Now, the first thing a whole lot of people might think when they hear or see that is, "That's gonna shear off, just like the other early systems did." No, it doesn't. I've had mine on for a couple of years now, and run it through a lot of drills, classes and abused it in a most villainous manner, and it has not failed me.

The PWS is a venting, hybrid long-stroke system, and the ability of the system to resist carrier shear is due to the long-stroke design. In a short-stroke system, the

piston pushes directly on the thrust shoulder. No matter how precisely you engineer or fit such a system, there will be some free movement of the piston prior to its impact with the thrust shoulder. The system will always have a small (and in some individual rifles negligible) impact along with the push. They are not all-push setups.

With the thrust shoulder being impacted, however lightly, on each shot, it is inevitable that if it is being supported by screws alone, the screws will fail.

Change that to a long-stroke, where the piston is attached to the carrier, and it is all push. No matter how brusquely the gas hits the end of the piston, the bearing of the piston to the carrier will experience a push. If the gas impact is great enough, the piston will flex and bend under the load, and still transfer the load as a push



The PWS conversion fits nicely under a Daniel Defense omega rail, in this case a 7.0. The result is a compact, easy-to-handle carbine that refuses to quit working.

to the carrier. Now, that is negated somewhat by the support tube PWS has on the system, to dampen rod flex. But there is still enough rod movement to decrease the impact on the carrier attachment. Thus the system is much less vulnerable at the connection between piston and carrier than short-recoil systems are. And there's a pair of secrets: First, there's an anti-shear pin inside the bolted-down block that holds the new piston. Second, there's an actuating piston inside the gas block that pushes the long piston rod and also vents as it cycles, dumping off excess gases. Long stroke and an internal anti-shear pin – you've got the best of both worlds.

Some might quibble that an internal tappet piston inside the gas block means that the PWS system is not a true long-stroke system. Hmm. Perhaps the language simply isn't subtle enough to properly describe all the possibilities. And second, I get to call things the way I see them, and I see the PWS as a long-stroke system.

Now, the drawbacks to the PWS system, both of them, are minor. First, it isn't a do-it-yourself conversion. If you want the system, you either have to buy an upper or complete rifle from PWS, or you have to send yours in for conversion. The two systems will differ slightly, but they work in the same manner. Second, the



PWS makes a line of dedicated piston-driven uppers. Here you have everything to build the upper. Just add sights or optics, and you're good to go.



The PWS conversion is the only long-stroke piston system available for the AR. The rod is attached to the bolt and works like a champ.

disassembly is a bit more fussy, as you have to extricate the long piston rod on the carrier out of the receiver on disassembly, and thread it back in when you're assembling your rifle. But do it a few times and you'll get the hang of it.

The gas block of the PWS system has a Picatinny rail on it so you can attach a front sight assembly to it. It is the same height as the rail on the upper receiver, so any front sight that is meant for use on a railed handguard will work on the PWS. It also means that your handguard has to stop at the gas block or you'll have a conflict. This makes using some handguards

impossible. No, you cannot mill the gas block down (remove the Picatinny rail) enough to let a handguard fit over it. By the time you make enough space for the railed handguard, you will have cut into the operating parts of the PWS system. It would be better to select your handguard carefully, and if you simply have to use a particular handguard, consider cutting the handguard before even thinking of trimming the PWS gas block.

The system is available as an add-on in carbine, mid- and rifle lengths. The PWS-made upper can be had in SBR lengths, for those who have the correct Federal tax stamps.



The PWS upper has quick-detach sling swivel socket built in.

Despite deliberate abuse and neglect, the PWS piston continues to work, even though the rod has accumulated rust from somewhere. As it is stainless, it can't be the source, but it won't stop.

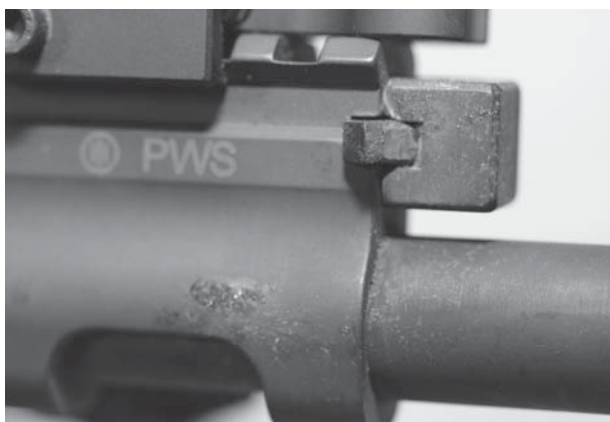


One of the biggest advantages of the PWS system, after the piston itself, is again the long rod. It prevents carrier tilt. (And probably, more than rod flex, it's the reason for the guide sleeve out front.) The long rod does not allow the carrier to tilt to any significant degree simply due to there being no place for the parts to go, should the carrier desire to tilt. The gas block is not simply bolted in place, staying put via friction, but when a PWS-approved installer puts the block on, the block is pinned in place.

As with all systems, it adds a bit of weight – PWS

says four ounces, which sounds about right. I didn't weigh mine before and after the conversion, so I don't know, but I'm not going to worry about four ounces. Heck, you can just about do that much damage to your full-up weight bolting on an extra set of tactical sling swivels, "just in case."

Now, PWS isn't a one-trick-pony, and they do have a sense of humor. They also make an anvil-tough buffer tube for carbines that you'll be seeing later in this book. They also make the Diablo, a short-barreled rifle and upper, in 5.56 and 7.62X39. One year, they promoted



At one point I abused the PWS so heinously the gas system block could not be removed without pliers. Rusty, it still soldiers on. That is a level of dependability that is difficult to top.

PWS also makes a muzzle brake, one that is low-profile and effective. Still, I view comps as competition parts, and not defensive or team-tactics parts.



it by showing a poster with a pair of SWAT officers all geared-up, along with their geared-up dog. The dog? A Corgi. A Pembroke Welsh Corgi, which, if you know anything about dogs, is one of those breeds that doesn't ascribe to the "small dog" theory. They're smart, they're loyal, and they will step up if you won't be the leader of the pack.

Well, PWS makes an SBR that doesn't think it is a small rifle, either.

I sent my rifle in to PWS for a conversion as soon as I heard of their setup. What I sent in was an American

Spirit Arms lower, mated to a Stag 1:9 chromed barrel, no-name M4 upper, and the whole shebang had an ARMS S.I.R. (Selective Integrated Rail) system for the handguards. PWS unbolted everything, installed the piston conversion, put it back together, and had it back to me in no time. It worked like a champ, and I had a fun time thrashing it through drills and classes. But I found that the ARMS S.I.R. handguards, despite being nearly indestructible and having a removable lower (for the M203, which is an item of "man-jewelry" I lack) it was just a bit too large for my hands. So I took it off and



Originally, the PWS conversion went under an ARMS SIR forearm. But you don't need that much size, as the PWS conversion is very compact.

replaced it with a Daniel Defense 7.0 Omega rail. I left the ARMS 40L BUIS in place, for the simple reason it is an excellent sight and it has never needed any adjustments.

The 7.0 Omega matches up nicely with the gas block, and the folding front sight from Midwest Industries I installed there is handy but out of the way. I then subjected the poor rifle to a series of gruesome tests. I shot it though an entire week-long LEO class without adding any lube at all, and deliberately took it out to the range afterwards on a rainy day. I let it get thoroughly soaked, and didn't clean it afterwards.

So, it had a week of crusty carbon buildup, followed by more shooting and rain. I then left it in the rack for as long as I could stand to and then took it out for more testing. First of all, the hand-removable gas plug on the gas block isn't so hand-removable any more. To get it squirmed out of the gas block I had to soak it with penetrating oil, and carefully use padded pliers to unlatch and then turn it.

Yes, an extremely unfair test. I should point out that at no time in the shooting – in the class, the rain, or afterward – did it fail to function. It was just a hassle to



The new, dedicated piston upper has a piston with a piston head on it. But it is still a long-stroke system and utterly reliable.

get apart, a hassle of my own creation. It was also unfair to the handguard and rifle, as exposed bits and pieces of steel were red and crusty.

The rifle is now one of my trusty loaners that I take to classes. If an officer comes up with an inoperative rifle at an LEO class, I hand him this (or one of a short list of others) to use while I figure out what is wrong with his. The short lecture is always the same: “Don’t touch the sights, and let me see any malfunction you experience.” Everyone has followed instructions so far, but there haven’t been any malfs yet to observe.

PWS has improved their design, and the new one uses a headed piston. The larger head provides a softer push (larger surface area, meaning less snap needed to get things going) and a self-scraping/cleaning design to the piston head. The PWS is still not a do-it-yourself project. If you want a rifle you have converted to the PWS piston, you have to send the upper to an authorized installer, who will make sure it is done right.

CHAPTER 8

CMMG



The .22 LR conversion from CMMG offers inexpensive plinking and training, and your investment is recouped in a couple of range trips. You don't have one? Shame on you.



**CMMG makes complete rifles, too.
You can have a conversion, an
upper or a full rifle, your choice.**

Based in Missouri, CMMG is a rifle maker with a difference: they started making rifles for retail, and expanded so much they moved beyond that to wholesale. Mostly, rifle makers start as big operations and do only wholesale sales. Small companies, the ones that make rifles (or other products) for retail sale, hardly ever expand to the size where they not just can, but must, go wholesale. And the number of small companies that expand to the point of going past retail are small, indeed.

At first CMMG made uppers, then whole rifles of the DI persuasion. While that was and still is a big part of things, they wanted to get into the piston field because, well, they had a whole lot of customers clamoring for them to do so. (And why else would someone in a market-based system do such a thing?)

I had a chance to see one of the prototypes when I visited CMMG for their 3-gun match, run in cooperation with FNH-USA. The match is such a big deal that getting in is now not easy, and once you're in you'll see why. CMMG has a large range on which to exercise their creative 3-gun minds, and come up with stages that a lot of other gun clubs would die of envy at the sight of. For an example, one year a combined handgun/rifle stage had you starting at the edge of the woods, and shooting the targets you could see with your handgun, working your way to your rifle (thus fulfilling the Clint Smith dictum that "a handgun is for fighting your way to the rifle you should not have put down.") Once there, you had to use your rifle to finish the rest of the targets, which were hidden by, and in some cases blocked by, the trees. Hit a tree, miss a target. Make it up, or take the

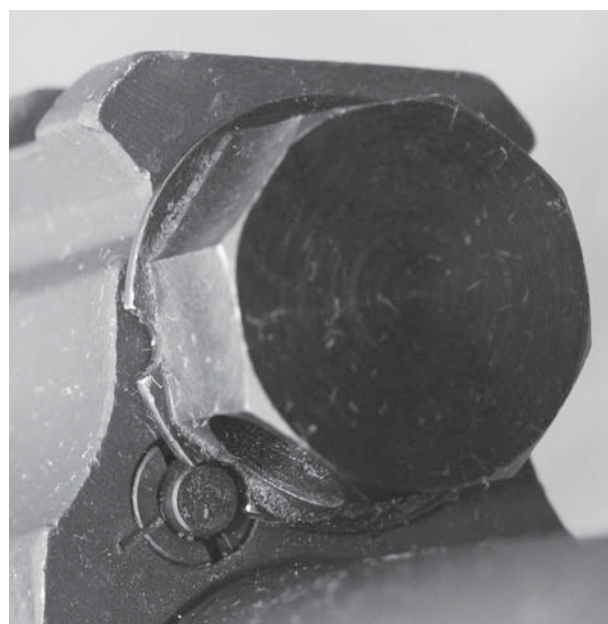


The CMMG piston system uses a carrier with an integral thrust shoulder on it.

penalty. The trees? They have plenty more, and a few rifle hits aren't going to bother the really big ones much, anyway.

I had a chance to try out the CMMG piston gun after the match. The prototype differs, in some very understandable ways, from the production gun. When I saw it, the gas block was a two-piece affair that was clamped onto the barrel by means of four hefty bolts. As an R&D method, allowing the block to be removed, replaced, re-machined or altered, bolting it on is just fine.

As a means of more-or-less permanently attaching the gas block to the barrel, it is not good at all. However, the production rifle/carbine uses a gas block that is pinned to the barrel. But not to stop there, CMMG goes even further. They offer a pin-on conversion as well as a clamp-on one, for those who want to convert their rifle to piston. The clamp-on, however, does not use the two-piece clamping system. Instead, the gas block is made as a single piece and bored for the barrel. Below the barrel, the extension is slit, and the cross-ways fitted screws clamp down with enough force to keep the gas block in place in spite of just about anything you'd care to subject

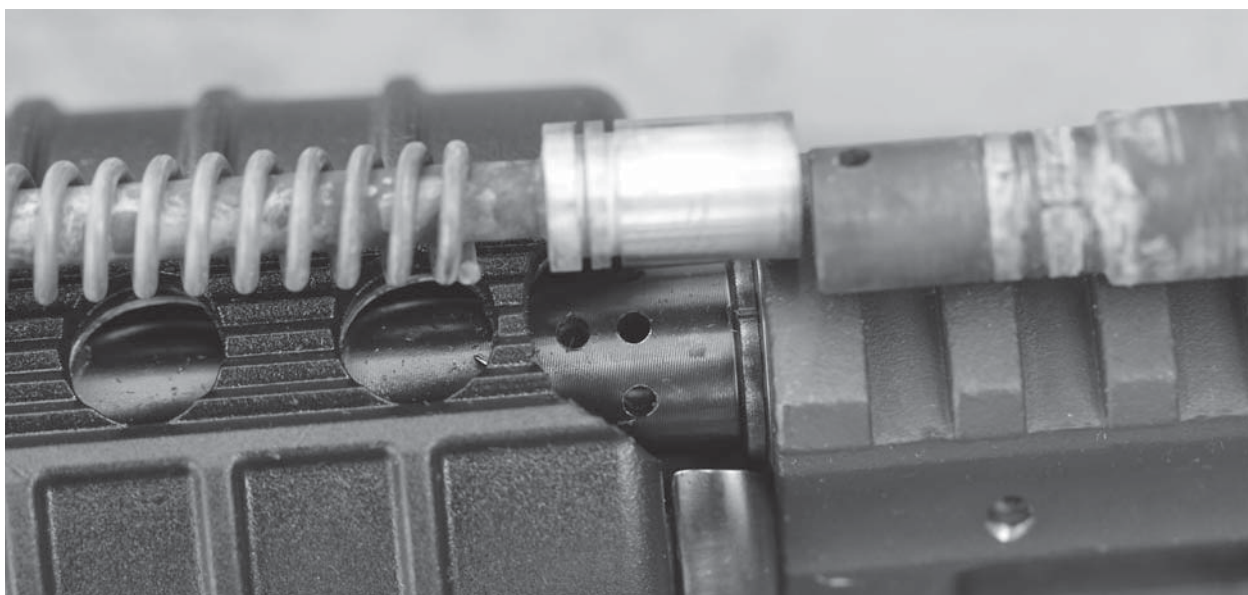


The piston conversion has two gas settings.

it to. How secure is CMMG in the solidity of their clamp-on system? It has a bayonet lug machined into it. How's that for confident?



The complete uppers and rifles use a piston system with the gas block pinned to the barrel.



You can see the distance the piston travels before it reaches the vent holes in the guide tube.

The block has rails top and bottom so you can install a folding (or non-folding, if you prefer) front sight on top and an accessory on the bottom.

Now, CMMG made this prototype, and worked it pretty hard. They found the things they liked, the things

they didn't, and the things they had to change. While they were doing this, I happened to arrive, and they simply handed it to me and said "Have fun." I had driven to the range for the match and brought practice ammo with me. I was very curious to look into the piston



Mmmmm! Tactical bacon. Get some!



And all piston systems require lubrication, or you'll carbon-weld the gas system nut in place.

system, and it wasn't until after I had inspected and photographed the piston part of it that I discovered they had handed me a select-fire carbine. And a fistful of their magazines. Yes, this is the kind of job you should be jealous of, and yes, I shot all the ammo I had available. It would have been impolite of me not to have tested their prototype as thoroughly as possible, and I was not raised to be impolite as a visitor.

For those who were wondering, no, there were no legality problems with me shooting their machine gun. I was, after all, visiting their range, and it wasn't like I was just going to toss it into my truck, wave, and say "Thanks a bunch, guys!" as I drove off. That would have been foolish, short-sighted and unlawful. I found that in firing bursts the carbine was very controllable, but then it isn't like the basic M4, piston or no, is going to push you around anyway. It was plenty accurate enough to hit whatever it was I wanted to hit at 100 yards, and the carbine and the CMMG magazines worked flawlessly. Well, flawlessly until the ammo ran out, and then they were of no more help. We should keep that in mind:

you're going to run out of ammo sooner or later, and when that happens, you'd better have a handgun, a big knife, or both. Oh, and some tactical bacon.

Not to be outdone in the quirky sense of humor department, CMMG makes and markets a line of canned tactical bacon. I'm not really sure how "tactical" enters into it, except for the canning part (long shelf live, don't you know) but when it comes to food, is there a more perfect food than bacon? Wrapped in tactical black labels, there is no question what is inside, since said label has printed clearly on it "tactical bacon."

Once they had it in production, CMMG sent me a piston-equipped rifle to test. It is the pinned version, and the carbine they sent is a basic version. (They do not do the clamp-on piston system on a piston-built rifle, only the pinned one.) Lacking sights, it had just a plain M4 type of handguards. CMMG can make pretty much anything, but when it comes to standard production items, they make the basic setup. After all, we all want different sights, handguards, pistol grips, etc. so why make the inventory situation totally impossible by trying to stock them all? Just make the parts people want (the carbine with piston system) and let them doll it up with the rest themselves.

We are, after all, AR owners. Most of us are institutionally incapable of owning something we haven't altered to suit our tastes. So, a plain carbine it was, but it suited me just fine.

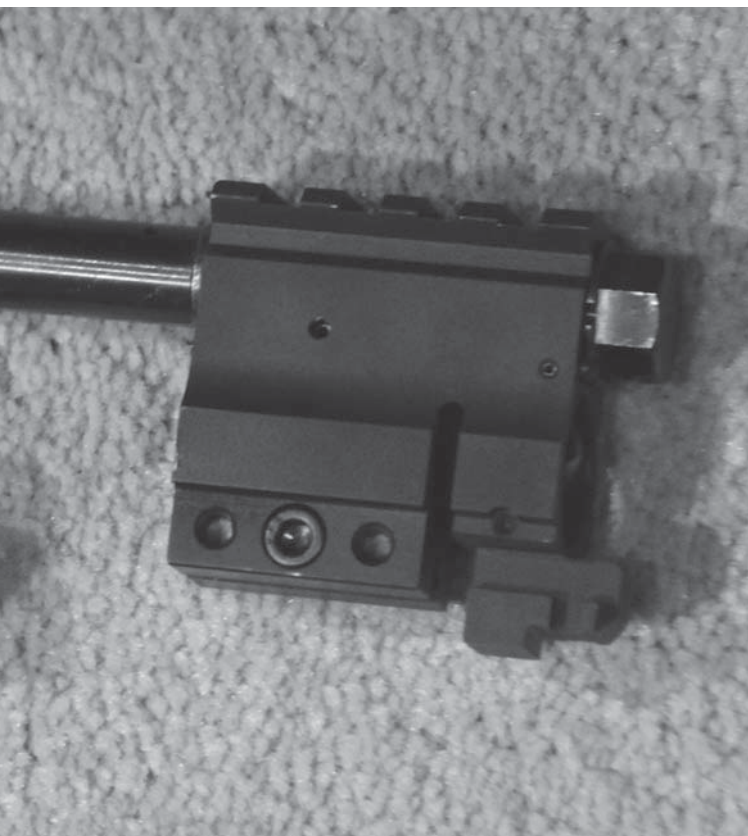
The CMMG piston is a short-stroke venting system, with an adjustable and removable gas plug, and a spring-loaded piston. The plug screws in, and there is a spring-loaded plunger for the two gas settings. Completely unscrew the gas plug to remove the chrome-plated piston. The carrier is machined with an integral thrust shoulder, and the bolt is a standard



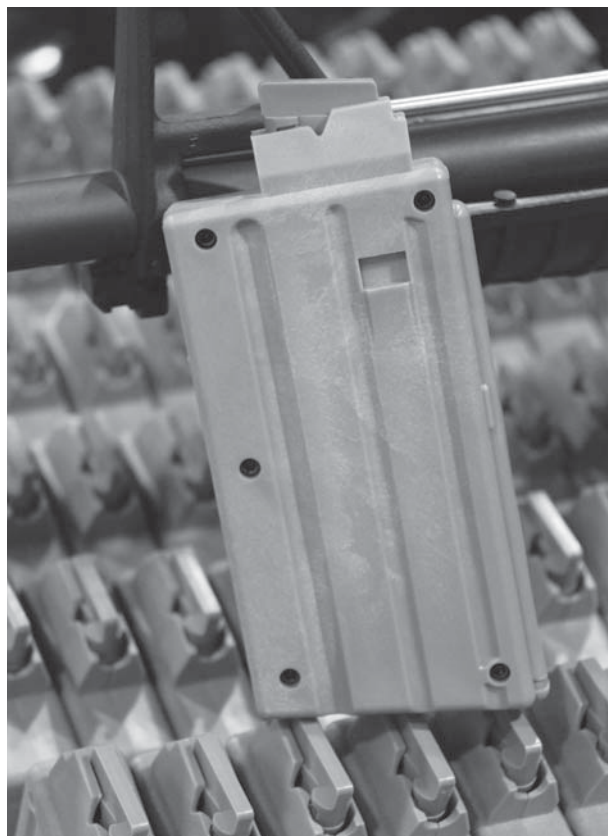
AR-15/M16 bolt. I'd have been surprised and just a bit annoyed at CMMG had they gone to the extra fuss and un-needed engineering of designing a new bolt. After all, that would also mean changing the internals of the carrier, and there's just no point in that. The M4 handguards needed just a bit of trimming by CMMG to accommodate the piston system, and the rest of the rifle was, well, it was just your basic bog-standard (to steal a phrase from the Brits) AR-15 carbine – which means anything you care to put on, will fit. Now, the gas block is high enough to accept correctly a front sight meant for use on an integral rail forearm. It is the same height as the receiver rail. So, if you want to install a railed handguard, make sure it has room for the CMMG rail, or be prepared to do some cutting (and you won't be cutting on the CMMG parts).



The CMMG conversion carrier has integral pads to combat carrier tilt.



The piston conversion uses a clamp-on gas block, designed to pinch onto the barrel for greater strength.



You need not worry about CMMG lacking magazines to support your .22 LR-shooting habit. They have plenty and can make more faster than you can wear them out.

I plopped an EOTech XPS3 on it, and went to town on drills. What can I say except it was boring. Well, not exactly boring, as who can be bored while shooting loaner guns (I don't even have to clean them!) with OPA (Other People's Ammo)? It worked flawlessly with all the ammo I had to spare for it and in all the magazines I used, including the CMMG-made ones.

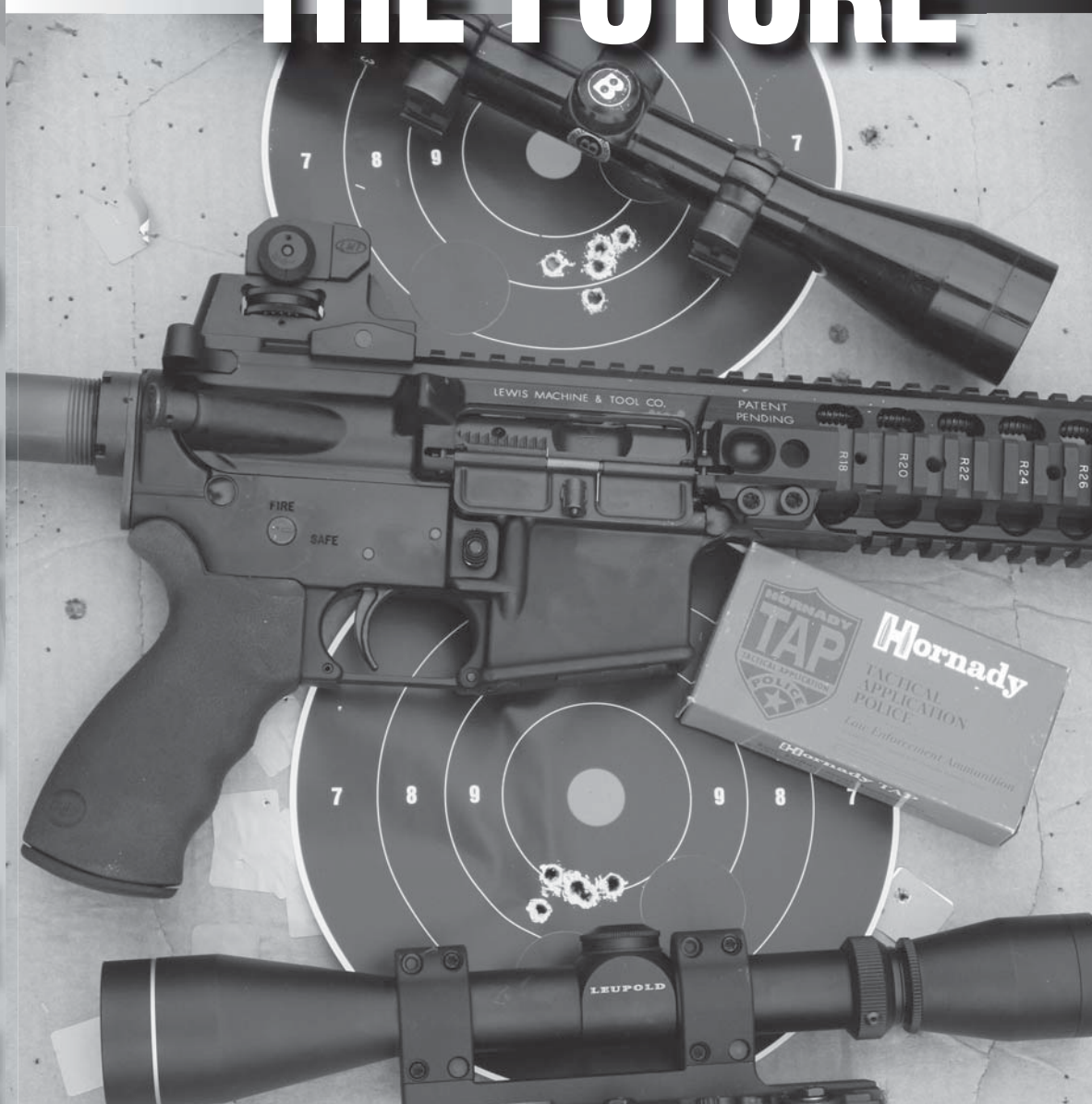
The empties were tossed to the side, the venting gases left carbon deposits on my left hand when I was not careful about where I had it, and the gas block heated up. In all, it was the kind of piston-driven AR experience you'd expect, except that this time it was a little more sedate. You see, CMMG had complied with the law, and only sent me a semi-auto version to test. They aren't allowed to loan out select-fire weapons, so if I want to test the current piston system in a select-fire

rifle, I'll have to drive to their range again.

Which doesn't sound like such a bad idea after all. There's a 3-gun match coming up...

OTHER PISTON GUNS AND THE FUTURE

CHAPTER 9



The LMT piston system only comes in their Monolithic Rail Platform, and not as a conversion. But, it is rugged, reliable, and obviously accurate.



The LMT is soft in recoil and reliable and offers more rail-estate than you need on three rifles.

I was not able to thoroughly examine and test all of the piston systems available. I only have so much time, ammo and opportunities to get to the range, and there are also rifles announced but not yet available when I finally have to send this book to press.

A couple of piston systems that have been announced but not yet released come from Les Baer and Rock River. The Les Baer system is still a secret, and there isn't a lot to be known at this moment. The Rock River is one I have handled but not fired. The system incorporates a forward-mounted charging handle, so you won't be scrabbling around at the back of the receiver to work the action, rather you'll be yanking at the front, like the ACR and SCAR.

The system, which they call the Performance Piston System, has the adjustable piston and other parts, including the recoil spring, over the barrel. That allows them to replace the usual AR stock with a folding stock system. The folding stock assembly takes a standard M4 telestock slider, and until I lay hands on one for testing I don't know if there will be enough clearance in the folding to install an Vltor or Magpul type stock. Also, the handguard on the PPS is not a standard one, so you will be dependent on Rock River for handguard styles there. If the system catches on, others will modify their handguards to fit (where they can) but for now, the RRA handguard will be it.

The S&W AR is part of the M&P series, and the rifle is



the M&P15. First available as a DI in 5.56, they followed that with one in 5.45X39 Soviet and now offer a piston-driven 5.56 setup. Called the S&W M&P15 PS, it is an adjustable, venting short-stroke system.

Lewis Machine & Tool offers a piston version of their monolithic rail AR. It is an amazing system, but you cannot get it without acquiring it in an LMT upper or rifle. As the LMT monolithic system is a premium one,



The Bushmaster piston rifle system differs from the conversion system, and you cannot get this setup unless you buy an upper or a rifle from Bushmaster. (Like that's an onerous chore.)

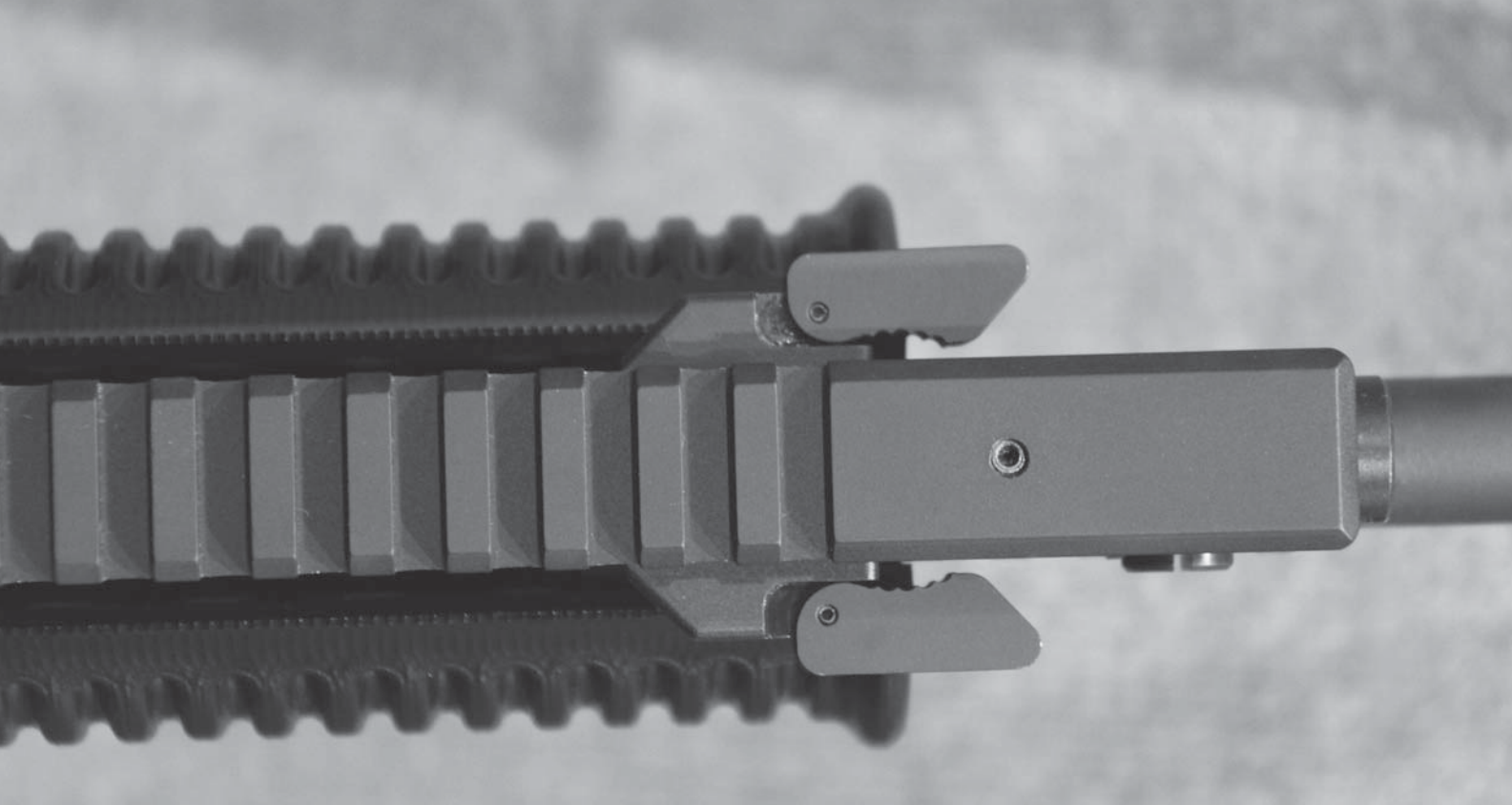


adding the piston makes it more so. A monolithic rail platform upper runs \$1300. The MRP as a piston adds another \$100. That's a lot to swing, "just" to get a piston.

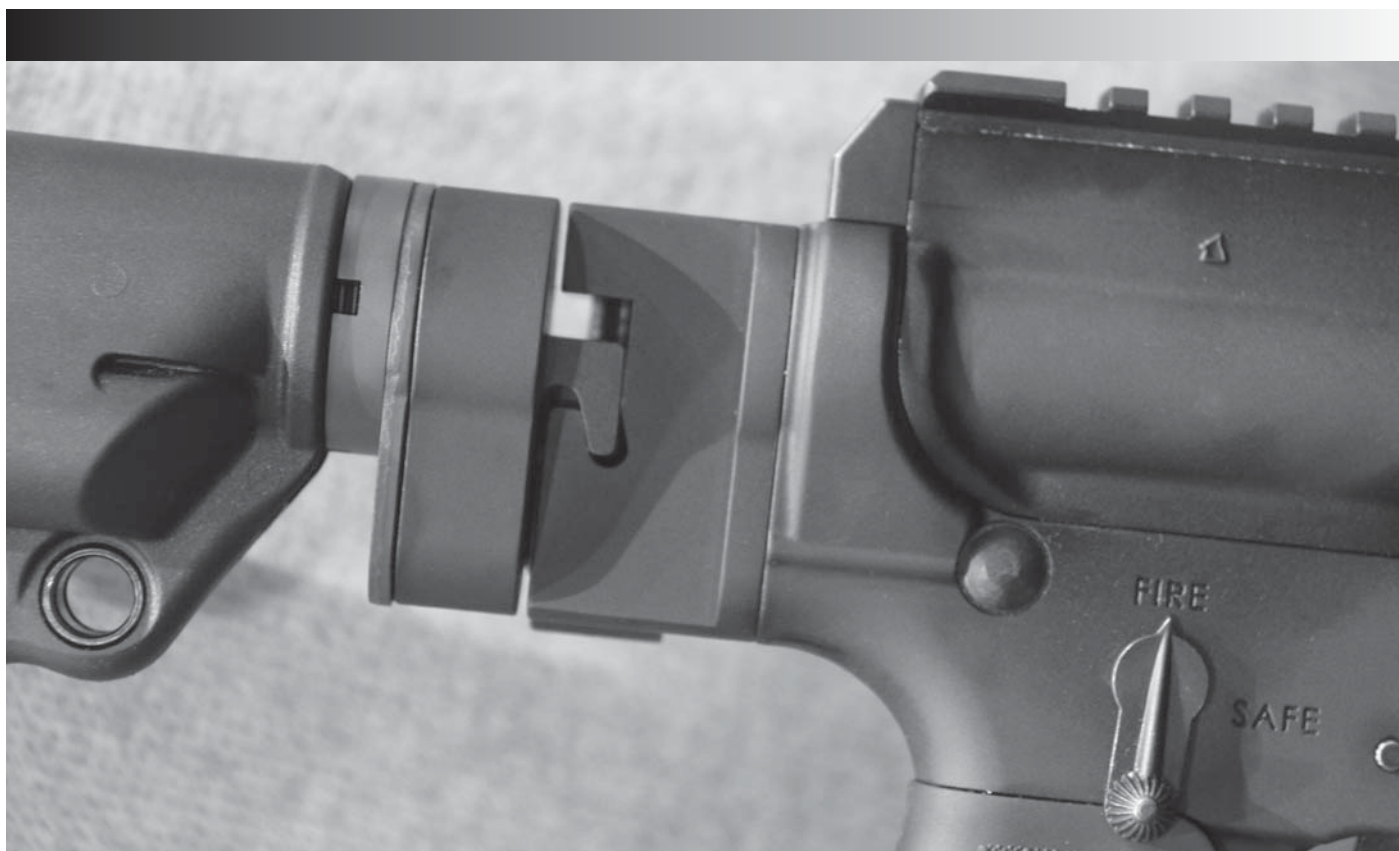
With the AR market in a temporary downslide, as shooters get used to the idea of an AR as a "real" rifle, and as manufacturers adjust to the temporary lack



The Rock River piston system is more than a rod over the barrel. The system allows for a folding stock.



Seen from above, the front-mounted dual charging handles of the Rock River system are clear.



The Rock River piston prototype has a solidly-locking folding stock, and shows a great deal of promise.



The Les Baer piston system will have a free-float forearm and a gas block with a sight rail on it. You can bet it will be properly engineered and precisely built.

of discretionary spending money on the part of their customers, we'll see a slow-down in piston offerings. I've already seen a prototype AR, fully-made, marked and ready for production, that got axed from the lineup because of the change in the market. We've had several basic-gun "commodity" rifle makers close up either the line or the whole business, due to the economic slowdown and the lull in the AR market.

That's the bad news. The good news is, that with the slowdown in sales, the R&D guys have more time to spend on perfecting systems. I expect the next generation of piston designs to be even more robust, foolproof and reliable. The Rock River PPS is one sign of that; given time, the AR platform will be stretched, altered and improved. Which is what the buying public expects and will demand in exchange for their money. It may well come to pass that in a decade or so, the gun-

buying public, having driven R&D and sales with their dollars, we'll see a new piston-driven "AR," one in which the only common part between the old and the new is the magazine. And maybe not even that.

While the Army has been screwing around for decades, trying to find a replacement, and never being able to get off square one, we, the guys on the outside, may end up having done the job for them. When that happens, the government officials involved will crow about how they tested the new rifle thoroughly, and as a result the soldier, sailor, airman and Marine will be better armed. They'll pat themselves on the back, and talk about how the system required excellence, and the system produced it.

We'll know better, because we were there first.

PATRIOT ORDNANCE FACTORY

CHAPTER 10



The POF 415, with its NP3 finish and integral trigger guard.



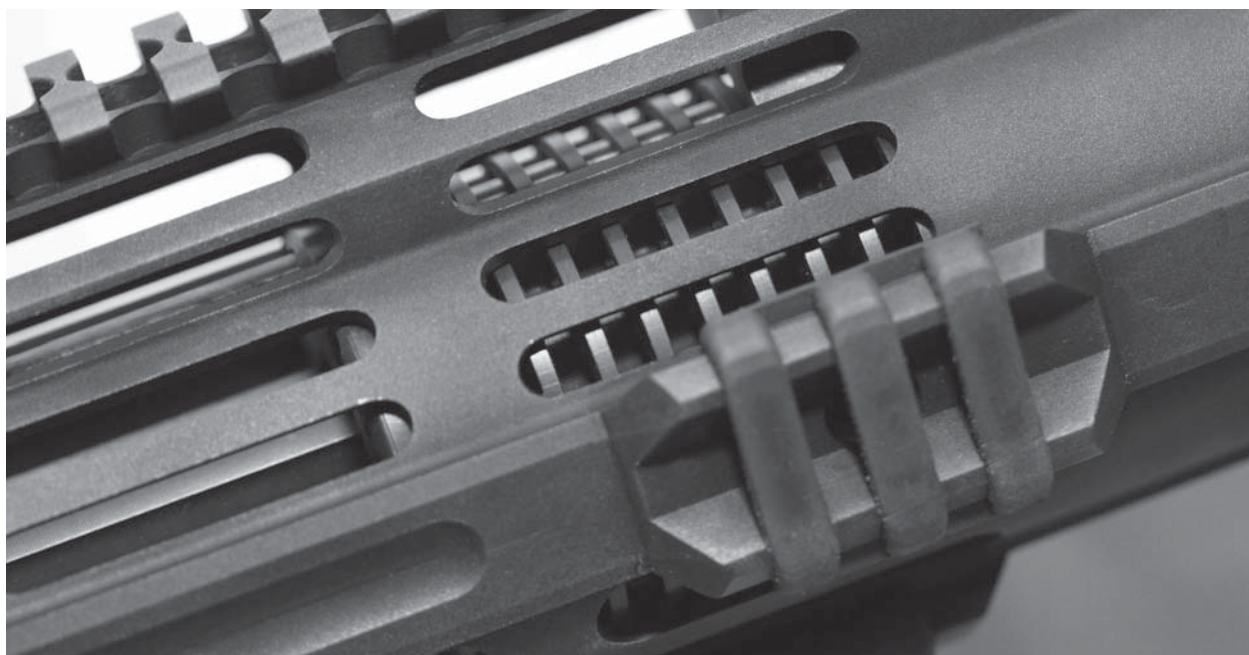
Note the right-side bolt release, just above the magazine button.

OK, time for a confession here: I have held off reviewing a POF (Patriot Ordnance Factory) rifle due to irrational reasons: looks. No, I'm not one of those guys who judges people just on their appearance, although there are some very scary-looking people in the entertainment industry. But looks do have an influence on all of us. There's just something about the looks of the POF forward rail/handguard that make me wince. The rest of their rifles are composed of items of glorious engineering, but the rail just makes me go "meh." In that regard it is kind of like the Porsche 911; I know the thing runs rings around other cars, but the looks just don't do anything for me, personally.

First off are the upper and lower receivers. POF is Frank DeSomma, and as an engineer he must be one of those guys who simply leaves a well-engineered blueprint when he leans against a desk. The lowers are machined from billet, while the uppers are machined from forgings. The uppers are A3 flat-tops, 7075 T-6 aluminum, forged, machined and then either NP3 coated or black anodized. The lowers are machined from billets of pre heat-treated 7075 T-6, and likewise NP3 coated or black anodized. Now, I have to give you fair warning: if you get yours NP3 coated, you will have a silver AR for as long as you own it. NP3 is a proprietary coating developed and promoted by Robbie Barrkman. I have



The POF top rail, an integral part of the handguard.



Inside the handguard, you can see the fins of the barrel nut/heat sink.

some experience with it, and I can tell you this: you will not get any kind of paint coating to adhere to it.

If you opt for the black anodized receivers, be aware that the interior of the upper will be NP3 coated. The idea is to provide several benefits. First of all it makes it

easier to clean. Second, the parts, rubbing NP3 plated surface on NP3 surface, provide smoother function and suffer less wear. You see, NP3 doesn't wear like other surface treatments. The nickel plating has teflon embedded in it. If you do manage to wear down the



The muzzle brake is low-profile but noisy to bystanders.

surface of an NP3 coating, you are simply wearing down to a deeper layer of teflon-impregnated nickel coating. Short of power tools, I'm not sure you can wear through a properly-applied NP3 coating. Nothing sticks to it, either, so you won't find a baked-on bit of carbon starting the wear.

The NP3 exterior? You can degrease and spray the outside all you want, but the paint will flake off. I suppose if you were to strip the receiver, degrease it and use a heat-cured finish you could get it to stay for a while, but as soon as the baked-on stuff flakes anywhere, that would be the shock-front of propagation, and the whole thing would be silver again in short order.

So once you go NP3, you can't go back. Think about that before you check the NP3 box for the external finish on your order.

The lower has the regular reinforcing bosses machined in, and the trigger guard is also an integral part of the receiver, oversized for wintertime use. Or, in these days, for gloved use in extremely hot climates. The magazine well is a bit oversized, enough to make reloading faster and easier, without being a goiter of competition size. The safety is right-handed only, with the safe and fire locations indicated by pictograms, the "bullet in a box" style that has become so popular. On



A 5.56 NATO chamber and a 1:8 twist, so you're good for any ammo you want to use.

the left side, the boss to locate the bolt hold-open latch is machined in such a way that it echoes the shape of the boss on the other side. I can see no other reason for it than cosmetic, but it is a nice touch.

On the right side, the details get more interesting. Above the magazine catch is a horizontal bar. That is the trigger-finger bolt release latch. Yes, you can drop the bolt with your firing hand, if you wish, instead of slapping the left side of the rifle. Now, the "fine motor control goes out the window" crowd will discount it, but I like it. It not only offers an option, but an option that requires you get your finger off the trigger to use.

The trigger is the Tactical Integrated Trigger System, a 4.5 pound non-adjustable trigger sub-assembly, held in by means of KNS anti-walk pins. The trigger pull



The gas system has a plug on the end, derived from the FAL, to allow you cleaning and disassembly.

is heavy enough to keep you out of trouble, but clean enough that you could shoot very good groups, according to your skill level. The stock is an Vltor telestock, on a six-position mil-diameter tube. Inside is a standard, not an "H," buffer weight. The pistol grip is rubber, and were I to keep this rifle in my inventory, would be the first thing I'd change. Some of the shooters I've handed the rifle to love it. Others don't notice it. Me, it is bulgy in all the wrong places, and the angle forces my arm/wrist to an unnatural shooting position. No slam on POF here, I

have an odd and unusual shooting grip, and pistol grips are a snap to change.

In the upper, the bolt and carrier are the standard mil-spec 8620 steel for the carrier, and the bolt with its own alloy, and the carrier nickel Teflon coated and the bolt hard-chromed. As this is a piston gun, the carrier has the thrust shoulder machined integrally to it, so there is no chance of its shearing off or breaking the (non-existent) screws. The charging handle is also NP3 coated, so things will be very easy to keep clean.



As long as you keep after it (and don't carbon-weld it in place) the gas system comes apart by hand. Press the button and turn.



The gas plug comes out easily.

The barrel is an instance of that marvelous engineering I mentioned. It starts as a bar of 4150 Mil-B-11595 vanadium alloy steel. The real-deal mil-spec machine gun standard. Bored, reamed, lapped and then rifled, it comes to the upper as a superb example of the machinist's art. It has been nitrite-treated and thus is both corrosion-resistant and case-hardened to 70 Rockwell, while the rifling is the benchrest design known as 5R. The twist is 1:8, and the barrels come from Rock Creek Barrels, Inc. They are harder than a banker's heart, tougher than sin, as resistant to corrosion as Abraham Lincoln, and it would take an impressive amount of shooting to put one of these out of commission.

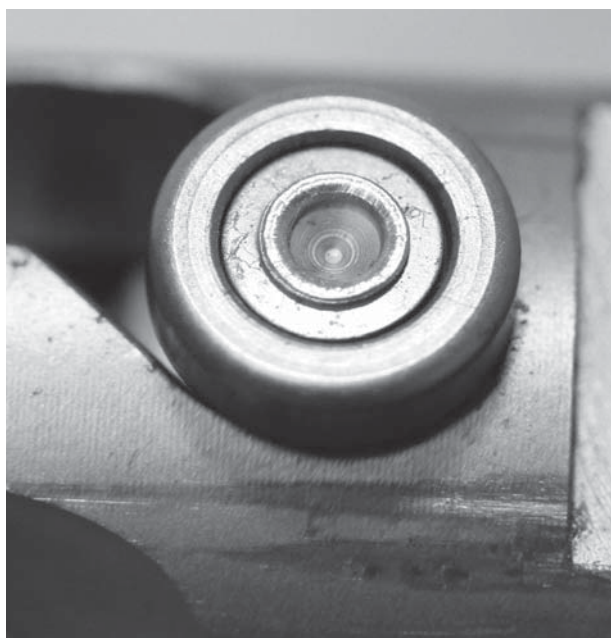
The muzzle brake is also a flash hider, but as with all such things it does one better than the other: it works great as a muzzle brake. It isn't the most flash-hiding hider of all time, but it isn't a flame-thrower of a brake. The chamber is 5.56, so no need to worry about 5.56 mil-spec ammo causing problems in this chamber. As

the guidance system of your bullets, the POF barrel gives you all the benefits you can expect from a barrel. Until there is some sudden change in chemistry, metallurgy or small arms design, it would be hard to find a better barrel than one from POF.

The barrel nut on the POF rifles is not just a means of torquing down the barrel. You have to see it sectioned to get a real grasp of what it is all about. The barrel nut is a tube several inches long that contacts the barrel around and forward of the chamber. It acts to dampen vibration (like the front bedding on a bolt-action sniper rifle) and it also works as a heat sink. Heat, when created, can either be drawn off or tossed away. But it cannot be wished away. By drawing the heat from the barrel into the barrel nut, you prolong the barrel life and length of time it is cool. But you also prolong the time the barrel nut is hot, so if you really heat this up (think Beta-mag dumps, as the swarms of zombies come over the wall) it will stay hot for a longer time than a non-heat-sink barrel/rifle.



The carrier and charging handle, NP3 plated.



The POF cam pin has a roller-bearing head on it.



The POF hammer, in the match trigger assembly.



There's so much nickel on all these parts, you'd have to be a Neanderthal to make any of it rust.

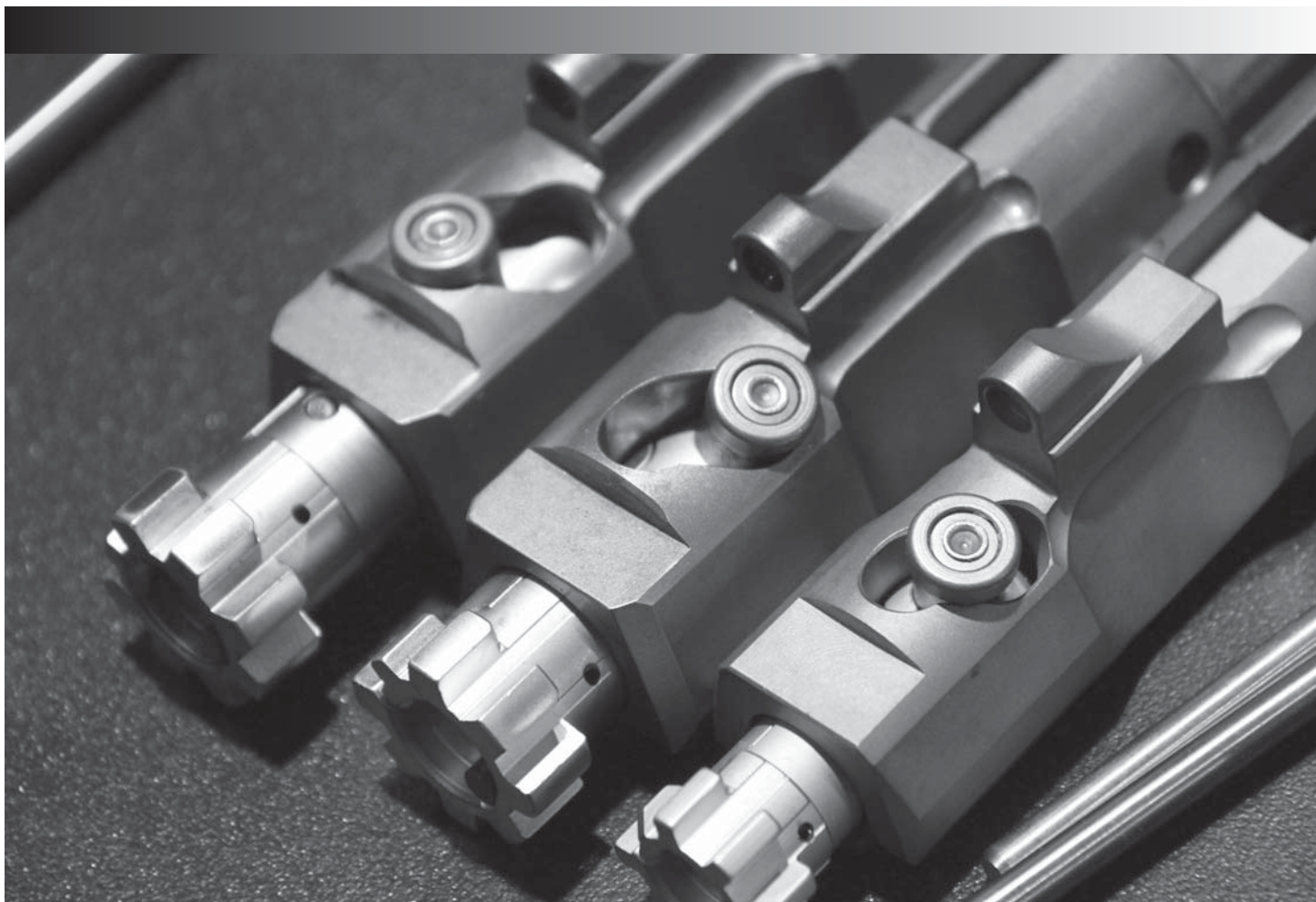


Nice shooting, but then that is a hallmark of POF rifles.

When firing the POF 415, you'll be using the piston system design by Frank: the Corrosion Resistant Operating System. Out in front, you will be interested to note that gas plug, which bears a remarkable resemblance to that of an FAL. And you'd be right, as that was the starting point for Frank. However, he went further, making the piston parts machined from billet, and either nitrate heat-treated and hardened or NP3 coated. The gas system nut works just like that on the FAL for retaining the parts, and coming apart for cleaning. Depress the plunger on the side and rotate the nut. The groove on the end is machined to provide a leverage location for you: the rim of a cartridge fit's the grooves, use a bullet as a tool. If, in the process of firing you've gunked up the system so much that the piston

doesn't want to slide out on its own, POF offers a tip: work the action. With the gas system retaining nut off, work the charging handle back a couple of inches and let go. Repeat, and you'll tap the piston forward and free of the carbon. Once out, you scrub and lube as you would any firearm or precision instrument.

Now, the handguard. The tube is machined aluminum, and the single rail on top is secured to both the handguard and the upper receiver. As a result, you have a rigid, one-piece location to mount scope, red-dot aiming devices, lights, etc. The system works like a champ, but there are inherent aspects of it you cannot escape. There is a price to be paid for everything. The huge barrel nut/heat sink means that the handguards are a tad portly. In all the engineering to make things tough



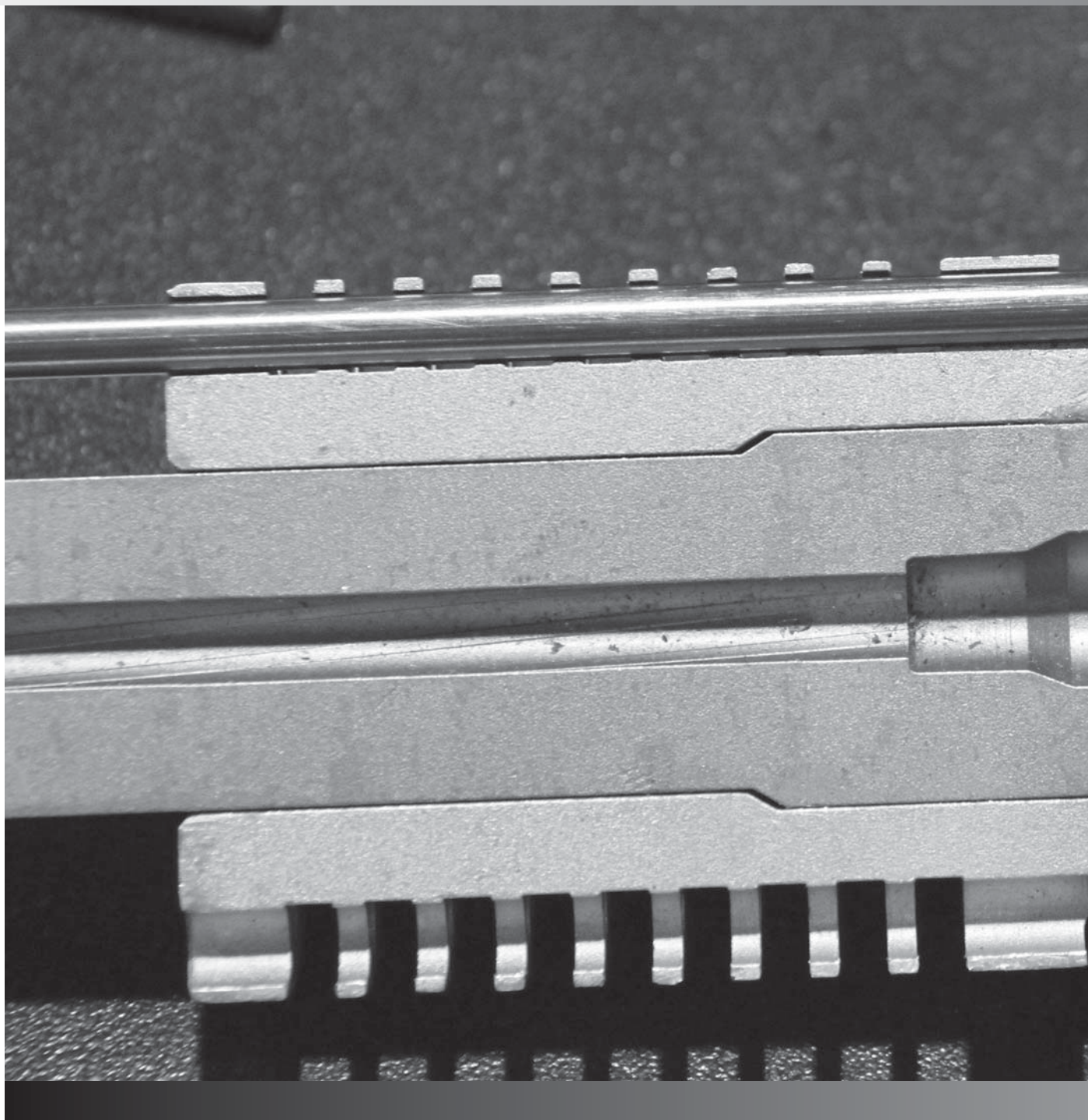
The POF roller-bearing cam pin is a standard feature on their rifles. You can get just the cam pin for your rifle, if you so wish.

and reliable, it is tough to make them compact. The top rail is also a bit higher than a regular M4 top rail. Now, since the rail is one-piece and level, you can install any rail-system sights and they will work. You can bolt on a set of Troy, MI or GG&G sights, and everything lines up. But your face will be a bit higher off the stock than it would be on an M4-proportioned setup. Ditto optics. But the setup is hell for tough.

The end result is another aspect of the POF that you cannot escape: weight. The 415 I have is your basic sixteen-inch 5.56 with a telestock, and before I add optics or BUIS, magazine and ammo, sling and swivels, the rifle goes eight and a half pounds. I can see a POF 415 with a basic set of necessary gear running close to 10 pounds. If you aren't careful, you can tip the scales at more than

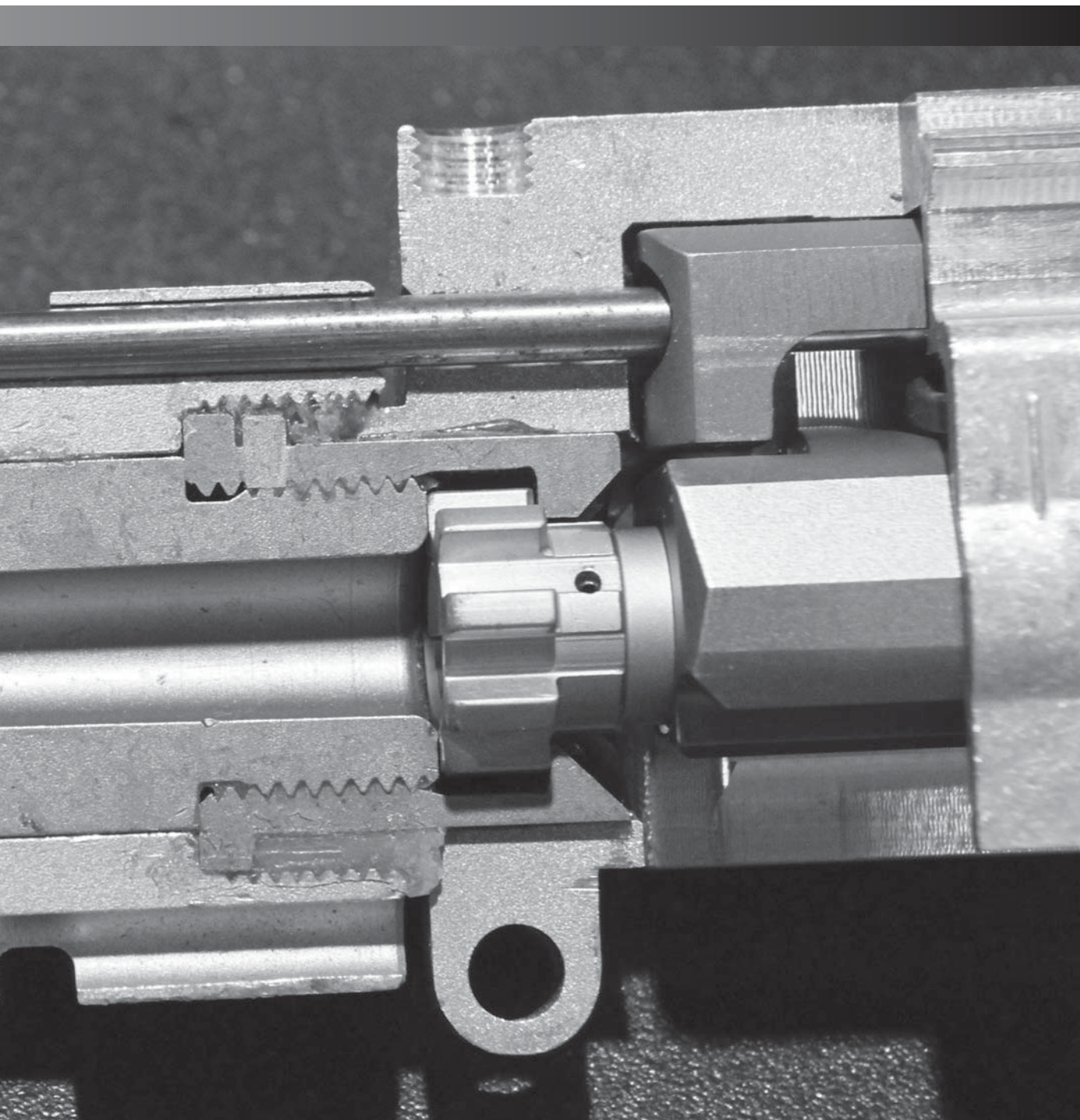
that. I can already hear the first grumbler: "If I'm going to be packing something that weighs 10 pounds, it is going to be something in .308." Except, you can't. A .308 that runs almost 10 pounds is a bare-bones rifle, and by the time you've added (if you can) a scope, light, magazine with ammo, sling, etc., your .308 is now nearly to the 12-pound area. Another of the Sweeney Laws: You get what you pay for, and you pay for what you get.

With all this grumbling you might think that I don't like the POF 415. Nothing could be further from the truth. The barrel is marvelously accurate. The trigger makes it a snap to wring all the accuracy out of whatever ammo you're using. The muzzle brake makes it soft shooting, and the weight is a help there. The rifle is utterly reliable, a hallmark of the modern AR, and the



height of the top rail, once you make the transition (usually early in the first magazine) becomes a non-issue. For the accuracy and reliability, the soft recoil, the bit of extra weight is not at all an onerous price. As I said,

were I to hang on to the POF, I'd be quite tempted to conduct a close study of the handguard to see what I could put in its place. But that's just me. If you find the handguard attractive, or the handguard doesn't even



The barrel nut/heat block. You can see how hefty it is, and how it can soak up a lot of heat from shooting.

register as an aesthetic element, then the POF line of rifles should be on your short list of ARs.

Last up, the price. Compared to some others a POF might seem like it is several hundred dollars above

the norm. But, consider the acres of NP3 plating that you're getting, and that marvelous barrel, and the price difference becomes inconsequential.

THE RUGER SR556

CHAPTER 11



Here it is: the Ruger AR, aka the SR556. Even a few years ago, this would have been unthinkable.



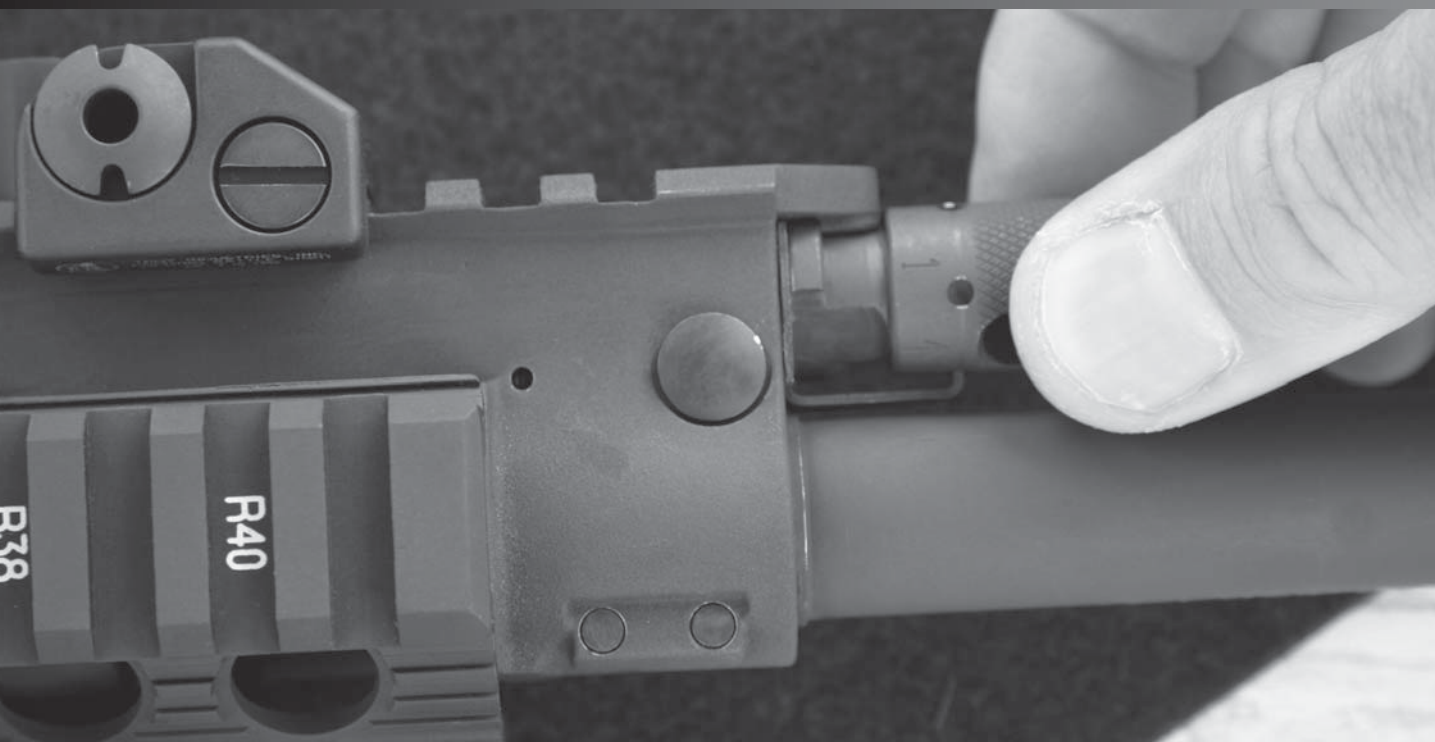
Within a couple of months of the first industry peek, I was seeing Ruger SR556s in training classes and in matches.

Traditionally, Ruger has not been known as a “tactical” gun maker. Part of that is due to Bill Ruger and his background. Growing up in New England before WWII, he basically came to business with the old-money blueblood attitude, and took that attitude into politics. (Or, at least as much politics as a gunmaker gets dragged into.) He designed machine guns during WWII, and after the war he designed and built products for the sporting market that were breathtaking in their utility, and used production methods that didn’t just “bend the cost curve” but hammered it flat. The Ruger Standard, later the Mk 1, a .22 LR pistol that sold for half of what the comparable Colt product did, was just the start.

Focused on making better and more-affordable hunting rifles and handguns, he really wasn’t plugged

into the defensive market. And, to be fair to the late Bill Ruger, the defensive market as we now know it really didn’t exist for the first couple of decades he was designing and making firearms. As a result, when it came time to confront the growing plague of gun control efforts, he simply (from my view, anyway) fell back on the educated upper-class N’Easterner attitudes he’d grown up with. To whit: men of good intentions can get along, and learn to compromise, and everyone will be happy and benefit. Too bad he was in a back-alley knife fight with uncompromising opponents.

After the infamous “I don’t know why a law-abiding citizen needs a magazine bigger than that” episode, Ruger was off the buyer’s list for a lot of shooters. I know of shooters who for a long time would not allow a



The adjustable gas plug can be set by hand, assuming you haven't made the whole front end red-hot from shooting. Remember: gas can be diverted, but not negated.

Ruger firearm into their home. Not only would they not buy them, they wouldn't have any of them where they exercised control: their castle. And when they did move into the new-to-them market segment, Ruger didn't move into the defensive arena with much authority, certainly not with the authority it had brought to the struggle with Colt, Remington and S&W.

That has changed recently. With the introduction of the SR9, a striker-fired hi-cap 9mm pistol meant for defensive carry, and its follow-up the SR9c, plus the LCR and LCP, Ruger clearly was taking the defensive-arm struggle to its competitors. Even with a thorough game plan and preparation, Ruger was unprepared for the reaction to a proper entry into the defensive firearms market. They announced the LCP (Light Carry Pistol), a compact .380, at the SHOT show. A four-day national industry convention, it is where many manufacturers unveil new products. By the end of the show, Ruger had orders for some 50,000 pistols. A month later, they had orders for over 100,000. When they announced the SR9 a year later, the demand was so great that Ruger stopped production of all other products at the Prescott, Arizona, plant except for the LCP and the SR9. Those two pistols alone were requiring more production capacity than the



The first SR556 seen in public, at an industry gathering.

entire plant, devoted to the entire rest of the Ruger pistol line beforehand, could provide. Ruger spent quite some time even getting close to catching up. So, it was with great interest that a bunch of us gun writers recently gathered at a private range for a writers-only retreat. There, we had manufacturers showing us the guns, gear and ammo that they'd be unveiling for the public



The first rounds out of the new SR556, while the rest of the gun writers waited their turns. We could not make it choke, then or since.

months or nearly a year after our little soiree.

Everyone was waiting to see what new bombshell Ruger would unveil. A new snubie revolver? A pistol in .40 S&W? When the SR556 came out into view, the crowd was stunned nearly speechless. (And when you consider the crowd, that's quite a feat.) Not at the sheer technical prowess of the product, but rather at the amazing fact that this was a Ruger-made AR-15. Not something someone else made, re-branded, but a Ruger rifle, from the large to the small parts. And a Ruger design in the heart of it, too, for it is a piston-driven gun. At the range session later that day, we took turns doing the obligatory "piston gun demo" where we each shot a magazine or two quickly, removed the bolt, and held it in our hands to show how cool it was. When it was my turn in front of the camera, I quipped, "We now know that the end of the world is near. This is a Ruger."

And it is quite the blaster, too. When it comes to entering the AR market, Ruger did not do as others had done, and enter at the basic-gun end of the market. As a manufacturing and marketing decision, that was a good one. The AR buying craze was in full swing when Ruger brought theirs to market, but anyone with any business sense knows that balloons don't last forever. When the

bubble bursts, the low-margin basic (fill in the blank) segment of the market takes more than a beating; it becomes a bloodbath.

So Ruger pulled out all the stops when it came to the SR556.

First of all, no, it is not the HK416 in US-made guise. Not that I have any feelings, good or bad, towards the HK 416. While I'm admiring of the engineering that went into it, I also think they (in typical HK/German fashion) over-engineered the thing. Had Ruger copied the design, and if HK had any patents on it, then by all means, HK would sue Ruger and I'd be in favor of it. If HK hadn't patented any of it, and Ruger copied it, well, too bad/so sad. As much as I'm a proponent of the defense of intellectual property rights, if you don't patent it, too bad. Were we to declare otherwise, the late Soviet Union, via their agent Mikhail Kalashnikov, would have owed the estates of John Moses Browning and John Garand money for every AK-47 and -74 they'd made. (And since Garand was a government employee, any of his designs belonged to the US, and thus the Soviet Union would have been paying us.) Short answer: it isn't any kind of patent infringement. The Ruger design is a short-stroke non-venting system that uses an internal



piston in the gas block and a spring-loaded transfer rod to drive the carrier. It is their own design.

The movement of the piston is the control (and the adjustable throttle, more on that in a bit) and is what regulates the transfer rod movement. Only so much gas

can go through the gas port and drive the piston, and excess pressure simply drives the piston harder, but not all of that excess is delivered to the transfer rod. But, we're getting a bit ahead of ourselves, so let's start from the beginning.



Once you get past all the “whose design did they use?” nonsense, you get to enjoy the wonder that is a Ruger offering in this day and age. The box itself is a cardboard carton with “SR-556” and the Ruger logo printed on it. I suspect in 50 years (assuming we still

Ejection, out of the sample gun when we first shot it was slightly forward. Did we change the gas setting? Not a chance.

have guns, or a civilization) that the cardboard box itself will be a hot item in the collector’s market, since most users will simply toss it.

Inside that is a relatively discreet rifle carrying case in black synthetic cloth, with the Ruger logo and name

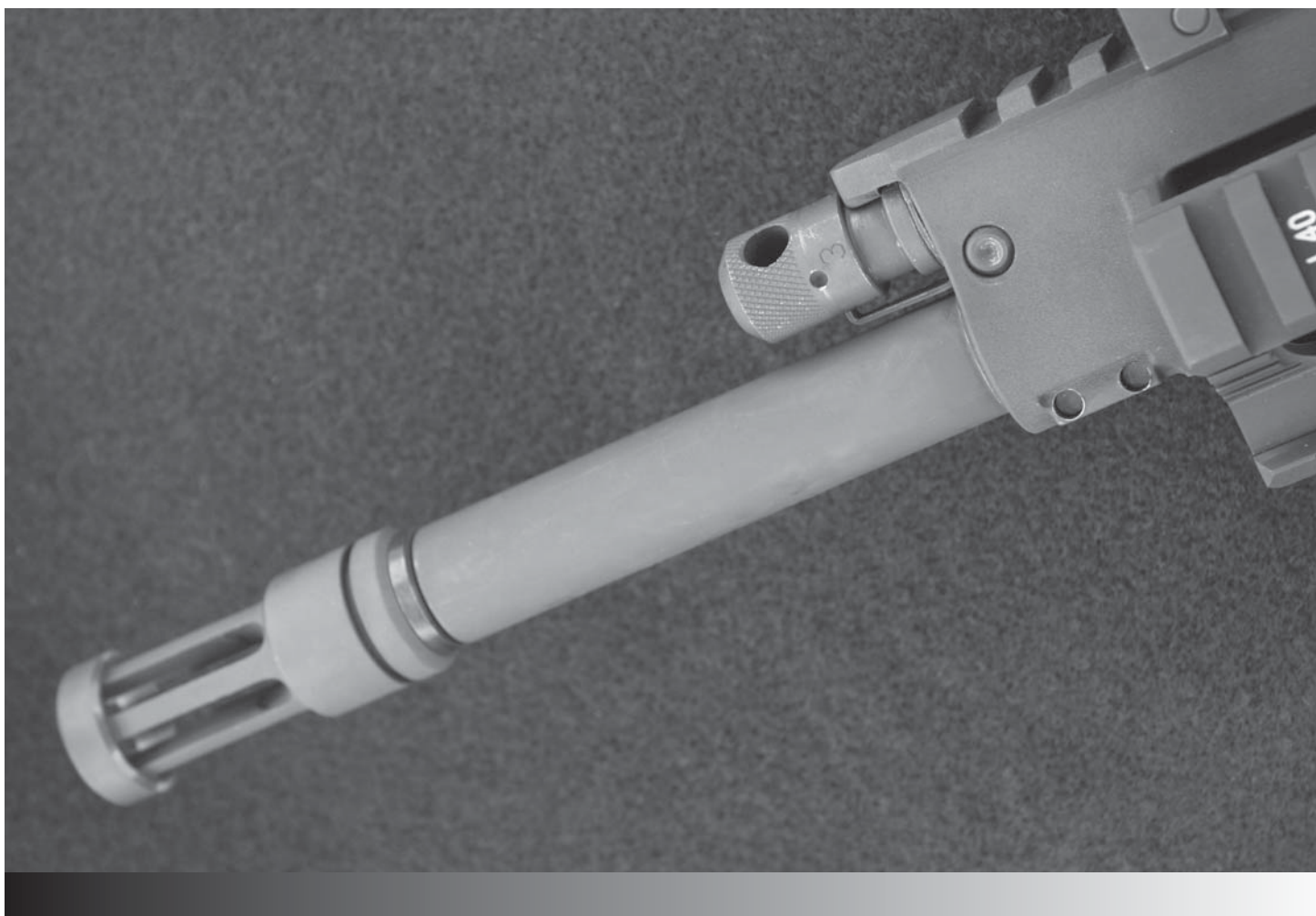


The sights are Troy, re-badged for Ruger. Ruger knows a good thing when they see it and didn't try to re-invent the BUIS wheel.

bonded to it, in red. The rifle itself comes with three Magpul PMag30 magazines, black windowless, a set of rail covers, an owners manual, and the Federally-mandated lock. (I sometimes wonder which of our legislators had a family business in the lock industry.) There's no cleaning kit and no sling, which is fine by me. I have a box full of factory-supplied cleaning kits and slings (and padlocks) that I never have a need for, so leaving them out doesn't hurt me in any way. But if you were expecting a cleaning kit or sling and don't currently have one of either, you'll have to buy one of those on your own.

The rifle itself? Oh, boy. The lower is a small-pin (there had been some early rumors that Ruger had used the same large-diameter hammer and trigger pins that

Colt used for a couple of decades. Wishful internet rumor-mongering, I'm glad to tell you) mil-spec lower marked "safe" and "fire" that, were it not marked with the Ruger lower, would not be distinguishable from any of the host of other mil-spec built semi-auto lowers. It has a Hogue rubber pistol grip with the Ruger logo in it and a six-position telestock with the Ruger logo moulded into it. The safety is not ambidextrous, and the trigger pull is a thoroughly acceptable mil-spec trigger pull. That is, it is creepy, gritty, and a bit on the heavy side as it comes out of the box. And, just like all the other milspec triggers I've ever used, I expect it to improve a great deal with a little bit of dry-firing and use. Ruger has had a reputation for some time of providing "lawyer-proof" triggers on their products. Maybe yes, maybe no, but



The flash hider is very much like the flash hider Ruger made for the select-fire Mini14. It is both effective and distinctive.

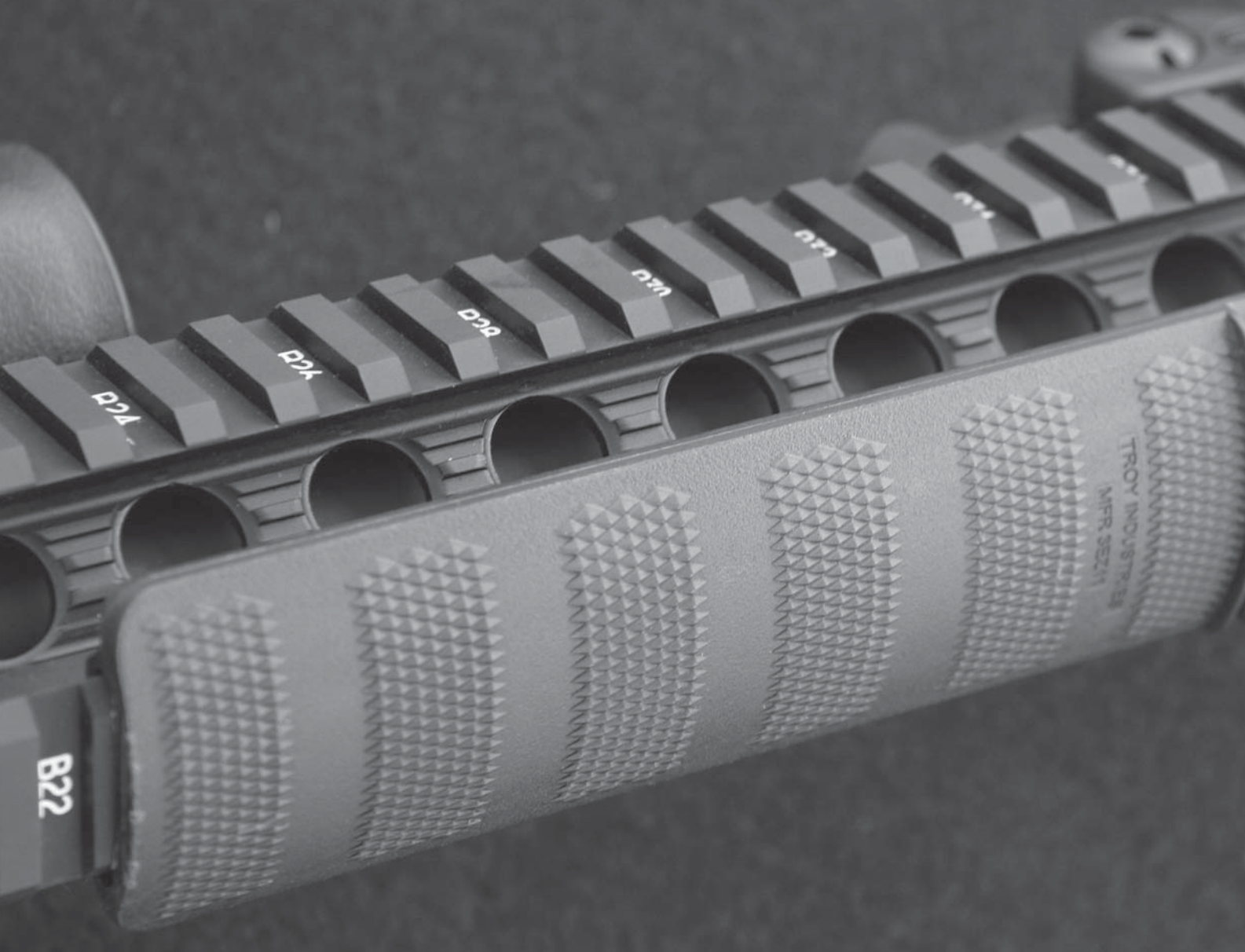
in this instance we can lay the trigger at the feet of the government. That is, mil-spec.

As plain, ordinary and unremarkable as the lower is, the upper is where all the action is.

First, the upper receiver is a flat-top, machined from a forging, complete with forward assist and ejector lump. The railed, free-float handguards are made by Troy Industries, and they're are marked with the Ruger name and logo. There is another interesting detail to them: they are secured to the upper. There are a pair of roll pins in the upper, one on either side of the joint between the receiver and the handguards at the top, and a single, much bigger one on the bottom. Clearly, they pin the two together, a good idea with a piston system running in between. The handguards are surmounted by

a set of Troy sights, both folding, front and rear. While made by Troy, they are marked with the Ruger name and logo. While Ruger has outsourced primo parts on the items they themselves do not make, they want to make it absolutely clear just whose rifle this is. (And it isn't your Father's Buick, for those who remember the old ad campaign.)

The gas block is pinned to the barrel, and the gas regulator is adjustable. It has four settings, from "0" to "3," and is meant to be self-regulating. Zero means no gas, so if you want to use your SR556 as a straight-pull bolt action rifle, go for it. The other three are increasing amounts of gas. The "1" setting is not meant as a suppressor setting, per se; it just delivers less gas. And the "3" setting is just more gas. Ruger recommends that



Troy rail covers, for those who do not like the feel of cold aluminum in their hands while shooting. Or hot aluminum, for that matter.

you not use a setting any higher than needed to run reliably with the ammo you've selected. (Factory-new, no reloads, thankyouverymuch.) Those lucky enough to have suppressors will probably run the Ruger on the "1" setting when they have the can installed.

Ruger recommends that ejection be directly out to the side, that is, ninety degrees to the direction you are firing. If it is "late" (Ruger's term, not mine, nor a common description for ejection) and throws the

empties to the rear, increase gas port size/number and keep shooting. If it is "early" (again, Ruger's term) with brass going forward, turn the gas port/number to a smaller setting. My bet is that since Ruger ships it with the regulator set at "2" and most ammo will work just fine that way, that we'll see lots of SR-556 rifles with the regulator frozen at "2" after hundreds or thousands of rounds fired. Most shooters will fire a few rounds, see that the brass is exiting the area with sufficient alacrity



The upper is full-on M4, flat-top, forward assist, ejector lump, as standard as Ruger can make it and not lower their standards.

and enthusiasm, and ignore the regulator afterwards. And, most shooters being most shooters, they won't go and wrestle the gas system apart after the first shooting and cleaning session. In a few years, I'd expect gunsmiths to start seeing Ruger SR-556 rifles with carbon-welded gas plugs in place, looking to have them removed for cleaning.

The two-piece piston, with the front part self-limiting as to the amount of travel it can experience, acts as a

thrust regulator, in addition to the gas regulation setting you crank the front knob to.

The transfer rod connects to the thrust shoulder on the carrier. The carrier is machined with anti-tilt pads in the back, with an integral thrust shoulder, and the whole assembly – bolt, carrier, extractor, etc. – is chrome-plated. Right smack dab in the middle of the carrier, where you can see it when the dust cover is open, the carrier is marked with the Ruger logo.



Even the tele-stock slider has the Ruger logo, lest you forget just who made this rifle.

The barrel is a marvel, for those who have been somewhat accustomed to the barrels of the Mini14s of old. Unlike those, which were widely varying in accuracy (some shot OK; a few shot well; and most were only casually accurate), the SR556's is hammer-forged out of 41V45 steel and has a Ruger AC556-style flash hider on the end. It is also chrome-lined, with a 5.56 chamber and a twist of 1:9. The last part is the only part that the cognoscenti have been able to muster a grumble about. They'd prefer a rifle with a twist of 1:7, just like the military barrels have. Well, get used to it. A 1:9 will fully stabilize all the common ammo, everything from 68 grains on down. It won't over-spin the varmint loads. It may even, depending on the individual rifle, stabilize the 75- and 77-grain loads. Ruger has clearly made a decision here that they expect the number of shooters using lightweight, fragile varmint bullets to outnumber

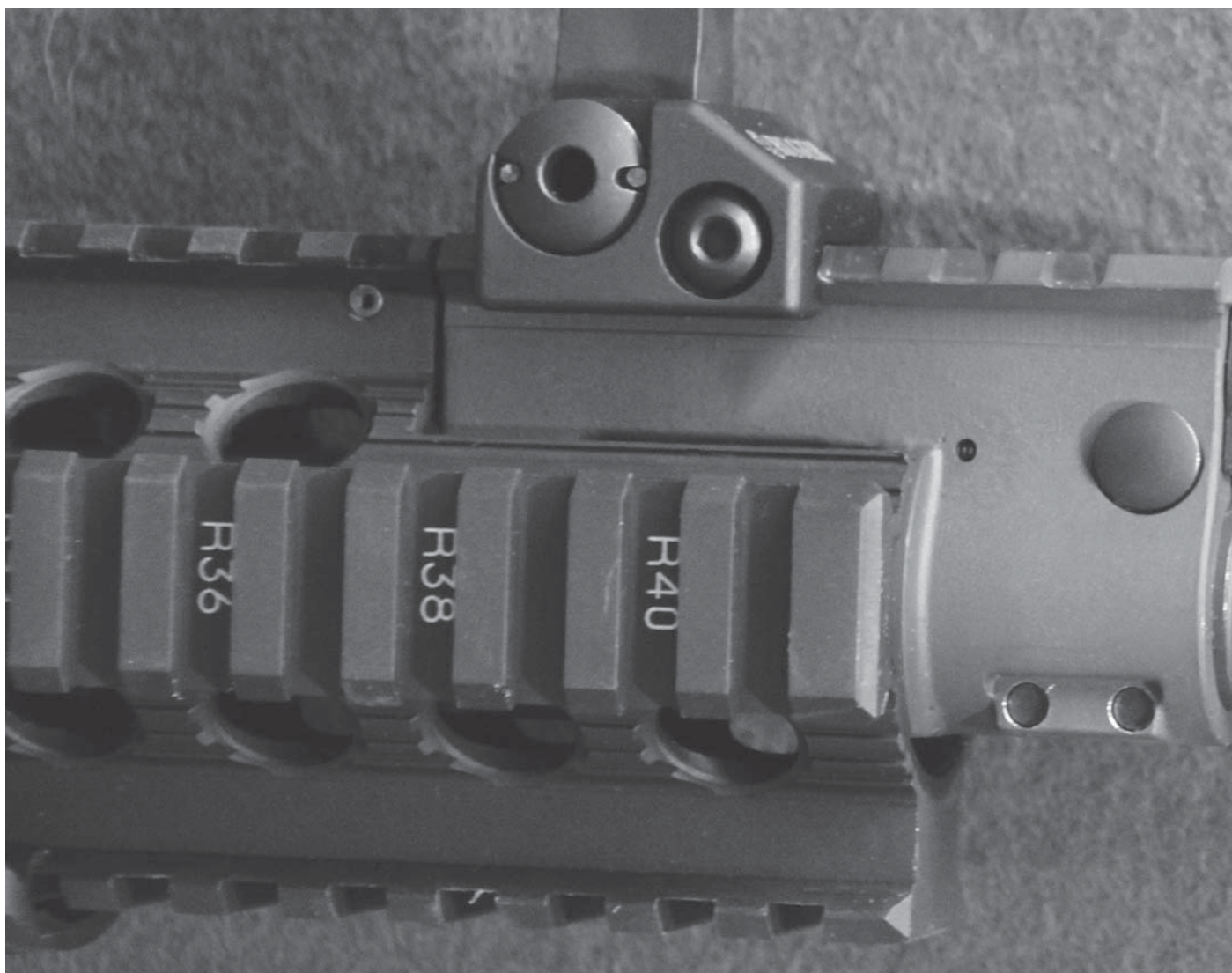
(probably greatly outnumber) those who would otherwise be feeding the SR556 a diet of Mk262 Mod 1.

Ruger, in a not-at-all-surprising decision, also makes a model of the SR556 that is "neutered." That is, instead of the flash hider and telestock, they make one (the SR-556SC) with the stock pinned open and the flash hider gone. It ships with ten-round magazines. So, if you live someplace where the politicians get an attack of the vapors at the thought of an "eeevil black rifle," you can conform with relevant (albeit idiotic) state law.

Ruger lists the SR-556FB as tipping the scales at 7.94 pounds. My postal scale tells me this one comes in at 7 pounds, 13.3 ounces. That translates to 7.83 pounds, which surprised me. I had been hefting it on the walk to the scale, and was convinced it wasn't the least bit less than 8.25. The apparent heft comes from the medium-to-heavy barrel profile, which brings the upper all by itself



The SR556 comes with Magpul PMags, and they feed everything .223/5.56 I could lay hands on.



to 5 pounds, 11.7 ounces. That same barrel will valiantly resist heat and change of impact, due to its mass.

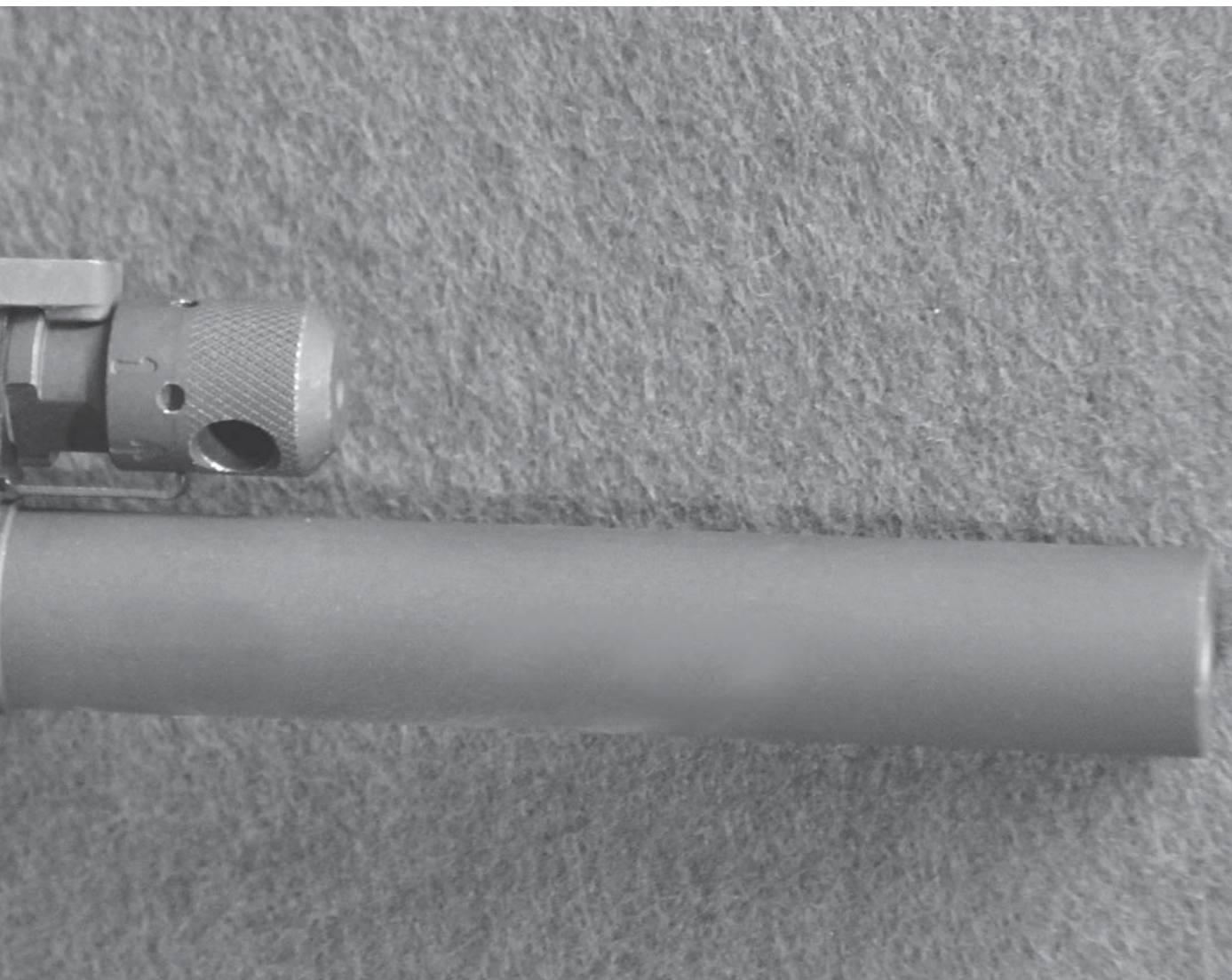
At the industry function, we enjoyed ourselves immensely, shooting up every round of ammo to be had. Partly it was the free ammo at the height of the ammo shortage, but it was due in no small part to the experience of shooting a Ruger-marked AR-15.

I waited a while once I had returned from the shoot, but Ruger finally sent me an SR556 of my own to test. On looking it over, I noticed a few interesting details. The serial number, for one, is done in two sets. The “SN” and the 590 prefix are done as one set of stampings, and the actual serial number of the rifle is a separate operation, done in a different font. The markings, the

Ruger logo and “SR-556” are done as a different operation also. I wonder just how many stamping machines this poor lower has been through?

The castle nut and back plate of the lower have not been mil-spec staked at the notches, a small but telling detail. And the buffer weight is a standard, not an “H” weight.

Disassembly of the gas system is simple: push out the piston regulator retaining pin and the parts will simply come out the front. The transfer bar, and its spring, won’t come out. They are part of the gas block, and to remove them you’d have to drive out the pins holding the gas block to the barrel. Such work is not advised. If you really feel the need to clean or lube your transfer



And for those who live in states where such things have to be neutered, Ruger makes an SR556 that lacks a flash hider, and the stock does not move.

rod, I'd suggest a liberal application of cleaner/degreaser via an aerosol can, though the rail openings. Then spray lube afterwards. That detail of disassembly alone is enough to preclude military consideration of the SR556 design. Can you imagine an apopleptic Drill Instructor who cannot have rifles detail stripped?

In firing, the SR556 works just as you'd expect from a Ruger, and recoils just as you'd expect a nearly eight-pound AR to recoil. Lots of ammo downrange, not much push on your shoulder, and empty brass flung to the right, not so far away that you can't easily find it.

As a premium rifle, the Ruger SR-556 comes with a near-premium price tag. But, once you total up the extras that come on it (railed, free-float handguard,

piston system, three Pmags) the rifle becomes a much better-appearing deal. And in fact the gun-buying public can do such simple arithmetic, despite the hand-wringing over the sorry state of our schools.

Ruger has not been able to catch up with demand, not from the moment they announced the SR-556.

CHAPTER 12

CONVERTING A DIRECT IMPINGEMENT CARBINE TO PISTON



The CMMG replaces the front sight housing/gas block, and pinches it onto the barrel. It includes a replacement carrier, as all conversions do now.



The Ares conversion fits onto your existing front sight, so you do not have to adjust the new setup for the front sight to be vertical. (Assuming it was vertical to begin with.)

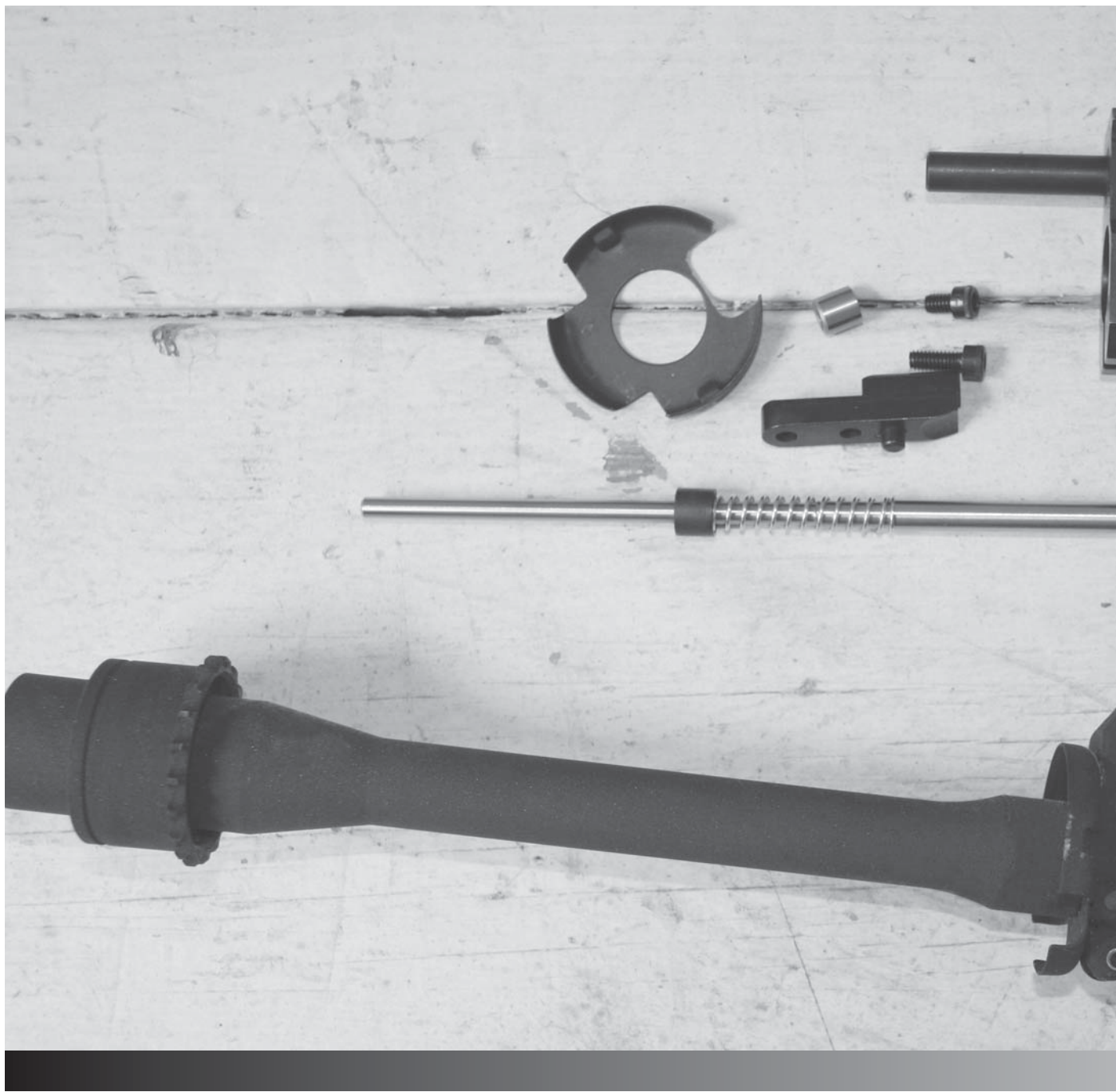
You have two ways you can go about this: you can take a rifle/carbine you already have and strip it down and rebuild it as a piston gun. Or, you can start with a box o' parts and build a new rifle up as a piston gun. Either way, you're going to run into a few tricky points.

First, you'll have to find a conversion. Right now, that means an Adams Arms, a CMMG, an Ares or a Bushmaster. Two of them replace the front sight housing, and two do not. Regardless of which you select, and which way you proceed, you should consider the forearm you're going to use. You'll have to be performing some minor to major surgery on your rifle, and this is an attractive time to also change the forearm. However, adding a forearm introduces variables of its own, so you should be careful and

thorough and test your rifle completely before you depend on it in a match or for real life.

Now, if you were going to change to a railed handguard, you should do that before installing any piston conversion. Remove the old handguards, and associated parts, and hand-install the new handguard. Don't tighten anything any more than you need to, to keep the parts in place. Then, with the rifle securely held, hand-install the piston system. What you're looking for are any conflicts. Is the handguard too long? Would it bang up against the new front sight assembly when everything is tightened down? Will parts rub or bind? Is there clearance under the new handguard for the piston, spring, gas block, clamping brackets, etc.?

If you want to use optics and other tactical bolt-ons,

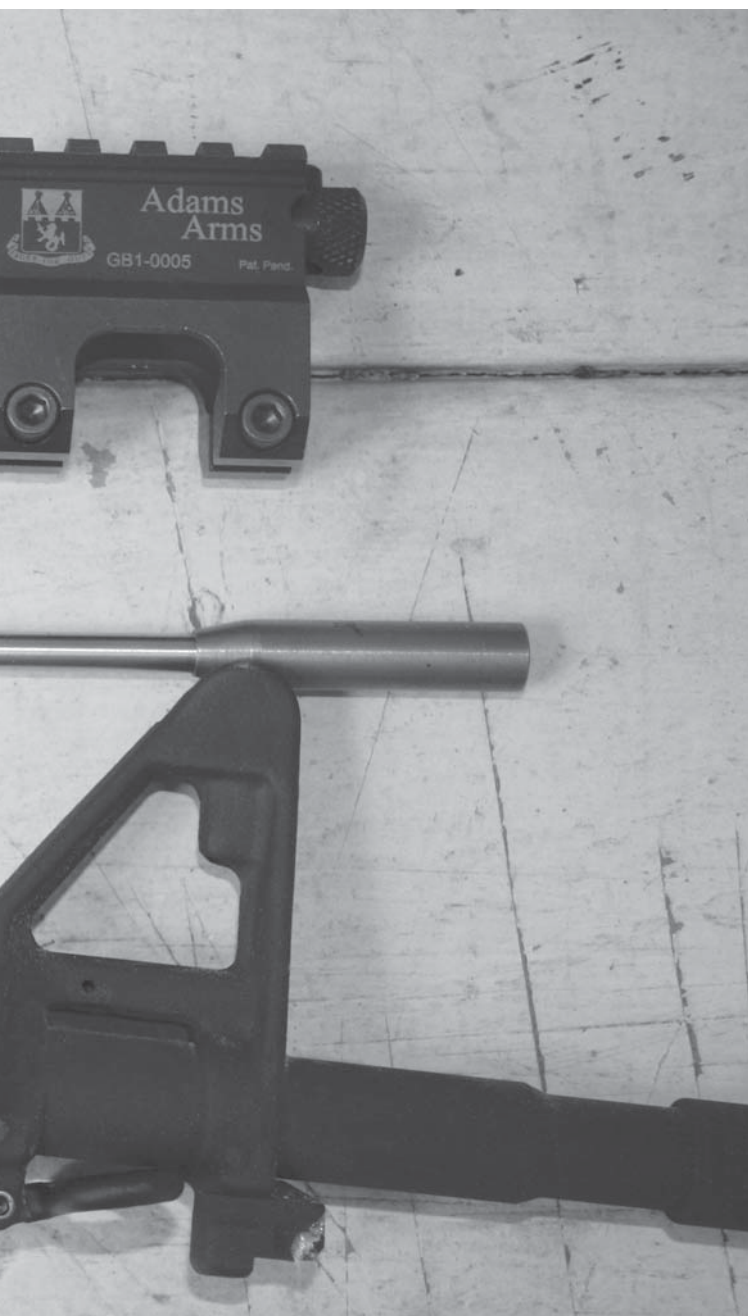


will they fit? Or will your laser designator only fit in a spot where it will be blasted by the venting gases of the piston system? Again, it is better to find these things out before you've done anything that can't be undone.

Also, let's dispense with all the canards about how men work and don't read instructions and always have parts left over. Open the box with the conversion kit in it. Check the contents. Make sure everything that is supposed to be there, is there, and you know which is what. Read the instructions. As you read the

instructions, pick up the part involved and look at it. Installing a piston conversion costs money, and making a hash of it will cost even more. You might even hurt yourself if you do a sloppy installation job. This isn't a race, nor is it a contest to see who can do the most conversions in a day. You're doing one, and you want it done right. So pay attention.

Let's start with the two that do not replace the front sight: Ares and Bushmaster. (The Bushmaster conversion differs from the Bushmaster-built piston gun, and you



The Adams uses a new front sight block, and you'll have to take care that it (and others) is installed vertical and doesn't bind.

to find out before you go and replace the front-end parts. You may have to remove the gas tube just so the new thrust shoulder doesn't bang against it and give you a false impression of a problem.

Once you're sure it fits and moves smoothly, then you can go on to the front end work.

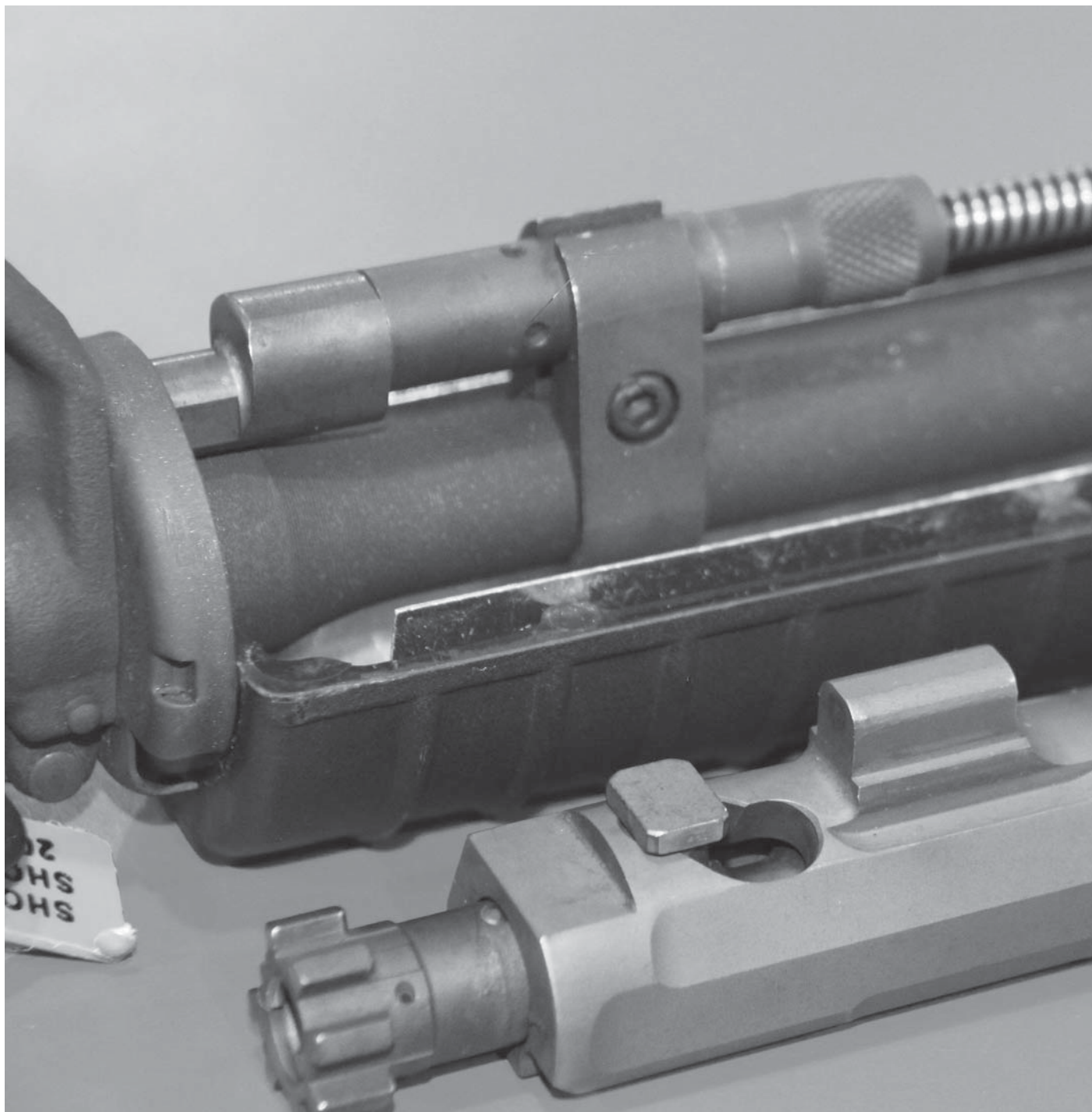
Drift out the gas tube retaining pin and remove the gas tube. Since your front sight is pinned on (most of them) you can't adjust the alignment of your front sight system, and that means you'll have to live with it. The new piston will ride in the topmost spline of the barrel nut, and if that is off-center, the piston will be tipped or even bind. So, as part of your fitting, check the movement of the piston rod on the spline, and make sure it moves centered and without binding. You may/should do this every step of the way, as some later work might create a slight change. Install the new pin, replacing the old gas tube pin, and lock your new parts in place. Check piston movement again. On the Bushmaster, you'll have a clamping bracket; lock that down and (you guessed it) check piston movement again.

Test fire at the range, and make sure things are working properly. More on that in a bit.

On to the ones that replace the front sight assembly: the Adams and CMMG.

You'll have to remove your old front sight assembly. That means using a Brownells front sight block, drift pin and hammer. The top-notch barrels will (usually) be held on via taper pins. The block instructs you as to which side is which, and you place your barrel in the block to drive the pins out. If you have a sight system that has clamping screws, undo them and remove the old front sight. Now, if you have a fully-equipped AR armorer's station, you can add an extra step before proceeding. You'll need a sight alignment bar. Use it to determine exactly where in space your current front sight is before removing it. Then, once you install the new one, you can

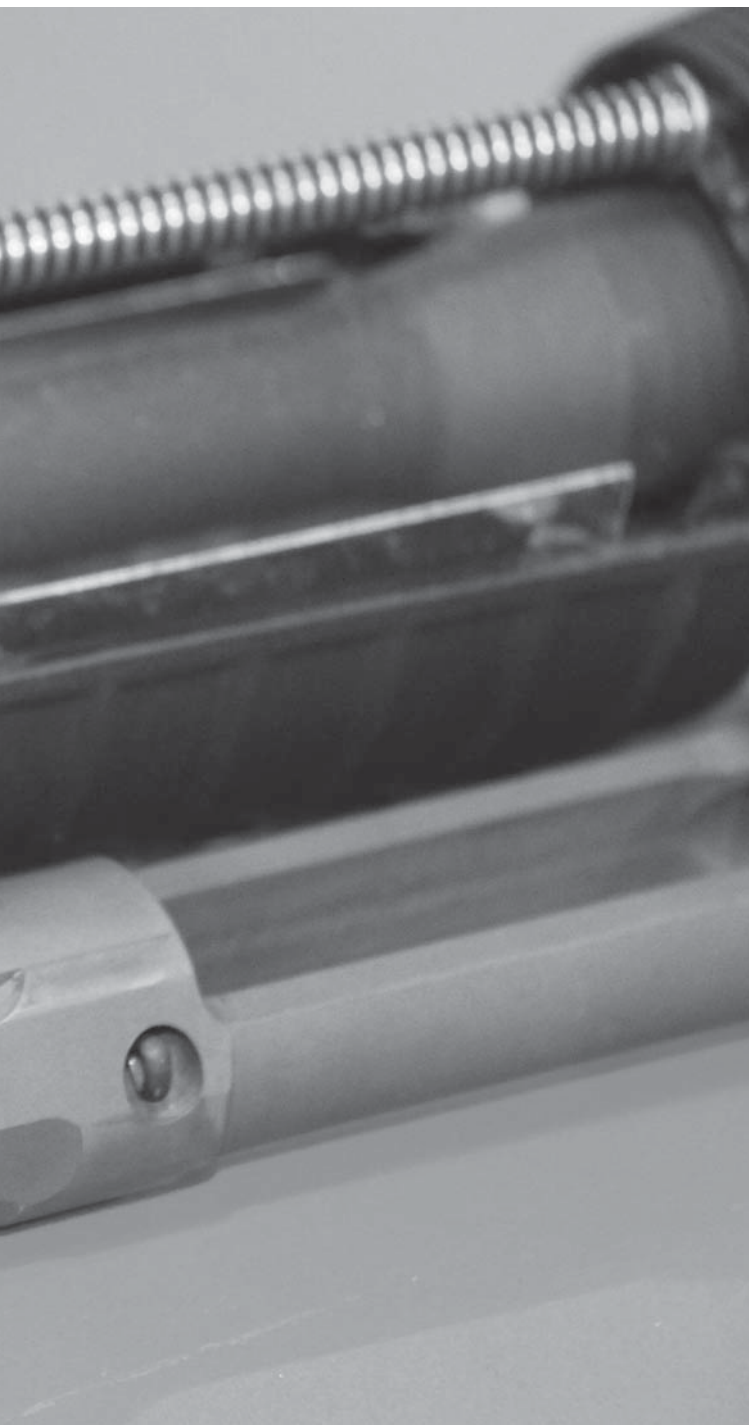
cannot get their piston gun as a parts kit.) What you'll be doing is removing the old handguards, as well as the upper receiver internals. Each comes with a new carrier, so you'll have to disassemble your bolt-carrier assembly and swap the old carrier out for the new carrier. I would suggest that the very first thing you do is clean your rifle, swap out the old carrier for the new, and then hand-cycle the bolt and carrier in the upper receiver. If, through some weird mismatch of dimensions, you have a rifle that won't take the new carrier, it would be best



use the bar again to get close. Most of you won't, and those that do will likely be doing this all to an M4-like upper, and thus not be able to use the bar. (No fixed rear sight, no trough for the bar.)

Not all barrels will be so easy. If you happen to have an obstreperous front sight, you may be in for more work. Taper pins can be tough to remove. Worse yet are

straight pins; they are an all-or-nothing proposition. If they are to come out, they come out easily. If not, they may require cutting, grinding or machine tools, to slice off the bottom of the front sight base and unlock the pins. I've had a couple of barrels like that. Since you're going to be replacing the front sight assembly anyway, no big deal, except for the work involved. Unless, of



The Bushmaster conversion kit includes a clamp that helps keep your new piston system aligned.

new gas block/front sight block, make sure the piston is aligned and moving smoothly, and leave it alone. Put your new front sight, if any, on the handguard. The harder way, and the correct way, is to take tools to the range, and test fire to check function while you align the block for a vertical front sight.

For this, you'll need the allen wrenches for the screws on your new gas block, a front sight, and perhaps a barrel nut wrench, blocks and vise. Take your assembled rifle and make sure your rear sight is centered in its movement. Fire at 100 yards (a bare hill of dirt or sand works wonders here) and note the bullet strike. If the gas block is top dead center, your bullets hit at the front sight. If it is tipped, they will hit right or left of your point of aim. If the bullet hits right, loosen and move the front sight to the right. If left, loosen and move left. Fire again and repeat the process until the bullet strikes at your point of aim. Now, unload and re-check piston movement to make sure it isn't binding.

None of this is difficult, just fussy. Once you have the front sight vertical and hitting centered, then get out the Loctite. Make sure both screws are snugged down. Carefully loosen one holding screw, apply Loctite to its threads and the bearing section of the clamping-on gas block. Let the Loctite wick in, and then tighten the screw. Give it a minute or two to set, then loosen the other one and apply Loctite.

Properly done, this will lock your gas block on and keep it there. You can, if you wish, mark the setup with paint or a scribed line, to check alignment in the future.

Check the gas vent pattern, making sure the parts are all tight, and shoot for fun. At the end of the session, check everything again. You'll probably find at least one thing that you either missed before, or something that came loose and needs re-tightening.

This isn't rocket science, it just takes attention to detail and thorough work.

course, your plan was to remove the front sight assembly to install a railed handguard, and re-install it for the new piston system. Sometimes life hands you lemons, and you have to either make lemonade or start over with different parts.

So, you've now gotten the old one off and are ready to proceed. The easy way to do thing is to install the

CHAPTER 13

RIMFIRES AND PISTOL-CALIBER CONVERSIONS



The two small ones are easier on the wallet, the shoulder and the ears. The .22 LR is the least-expensive real shooting you can get. The 9mm is a real cartridge and is plenty good enough to be an understudy for the .223.



One thing you have to be aware of: any .22 LR is going to be picky about ammo. Find what yours likes (reliability-wise) and feed it that. If reliable also means tack-driving accurate, you've got a bonus.

One of the advantages of the AR is that for a lightweight, compact rifle, you're getting small-bore rifle performance – as in 55-grain bullets at up to 3200 fps, and 75- to 77-grain bullets at up to 2700 fps. Of course, the drawback for that advantage is noise, penetration and ammo costs.

One way to ease up on ammo costs is to use a .22 LR conversion, or a dedicated upper or a dedicated rifle. Unless you go with Airsoft, or an air-powered lead-bullet firing air-rifle, you can't get lower cost shooting than you can with a .22 LR setup. And as an extra bonus (or bonuses) the recoil is non-existent, the accuracy can be superb and a lot of people look on something chambered

for .22 LR as a fun toy and not some evil instrument of destruction. No kidding. I've had people blanch at the sight of an AR, who were put in a more-accepting frame of mind when I told them, "It's just a .22."

Now, the change to a .22 LR is not all milk and honey. The earliest conversions were marginally reliable, and some were barely durable. I spent one AR class fussing over a conversion kit, keeping it running, as the soft metal this or that was made of peened as we shot it, and the various bits and pieces bent as they were used. We finally had to give up when the firing pin broke and we had no spare. (And no, I didn't have a portable welding rig in my truck. That is simply a rumor, idle



While a .22 LR can be picky, a 9mm must not be, especially if you plan on using it for competition or defense. Do what you must, to make your 9mm reliable.

speculation, that my truck was so well-equipped.)

There are three routes by which you can have a .22 LR-capable AR. The first is to simply remove your bolt and carrier, replace them with a .22 LR conversion, and use a conversion magazine. The second is to have a dedicated upper, where the barrel is a .22 LR-chambered and -bored barrel, using a modified conversion system, and the same adapter magazines. Third is a .22 LR-dedicated rifle. This can be an AR where you've done the .22 LR dedicated upper, and you've tuned the lower so the trigger, hammer, etc. are suited to .22 LR and .22 LR only. It will still use the same .22 LR specific magazine. It can also be a ground-up .22 LR rifle, shaped like an AR, such as the S&W .22. such conversion may use magazines that do not work in .22 LR-converted ARs, and only work in their specific .22 LR rifles. Each has advantages and disadvantages.

The conversion first. The conversion is simple, really: a .22 LR-specific bolt and recoil springs, in a self-contained package. The conversion does not use the buffer spring and weight of the 5.56 rifle, still in the lower, because they are far too strong for the .22 LR to overcome. On the front of the conversion package is a .223-chamber shaped extension. This is needed to guide the bullet from the .22 LR case to the rifling of the existing barrel. Which leads us to a shortcoming of the conversion: the barrel. First, there is the long freebore, the smooth tube leading from the .22 LR chamber in the conversion, to the rifling of the bore. That's a couple of inches in which the bullet can tip, rub off lube or even a bit of lead, and thus detrimentally effect accuracy. Second is the bore itself. A standard .223/5.56 bore is a nominal .224-inch in diameter, groove to groove. A .22 LR barrel is .221-inch. The slowest twist of a .223 barrel



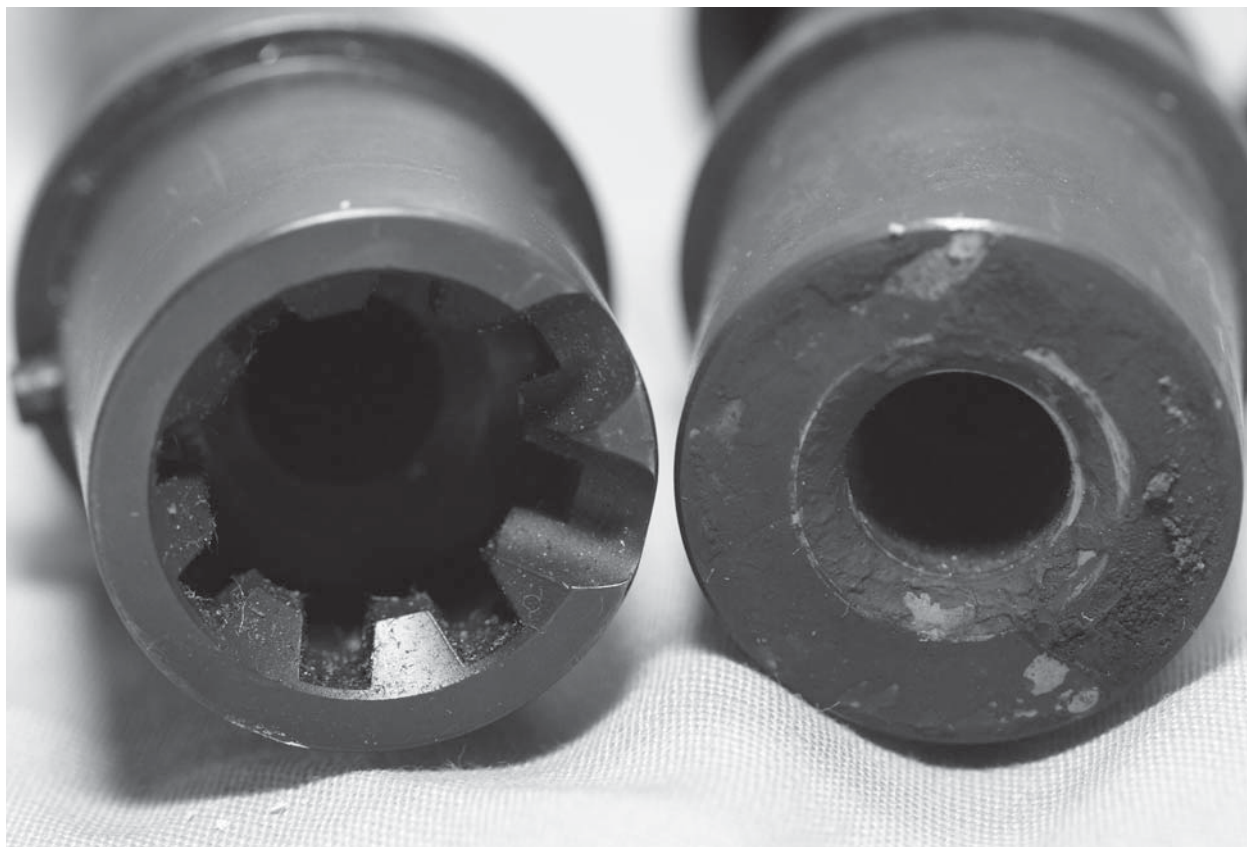
The 9mm (left) is the most common AR pistol-caliber carbine. While the .40 (center) has some attraction (and word is, the FBI is looking at .40 ARs) it doesn't offer what we want: low-cost shooting and mild recoil. The .45 is a tough one. It is a lot bigger, cutting down magazine capacity, and can be very fussy in feeding.

is one turn in twelve inches, commonly denoted as 1:12. The .22 LR is 1:16. So, at best, we have an undersized bullet getting a running start in a section of smoothbore tube, before being spun at a faster rate than designed. Yes, the bullet will “slug-up” to a certain extent, but not as well as it should.

Conversion kits are notorious for leading, building up fouling quickly, and losing accuracy after a short shooting session. The surprising thing is that they work as well as they do. That said, the older ones are, to put it mildly, crappy. You'll see them extolled as “military surplus” and such. We've learned a lot about conversion systems since then, and you'll be doing yourself a great big favor if you buy one that was designed and made currently, and not one that came out of a workshop

back when the Clintons were still learning their trade in Arkansas.

The second way to build a .22 LR conversion is to dedicate one. You can start with new parts, or re-build an existing upper with a shot-out barrel. The work is simple, but precise. Best to have someone who does it, do it. The process works like this: you/the gunsmith take off the chamber-shaped conversion adapter from the conversion kit. Then, replace the barrel with a .22 LR-specific (.221 bore, 1:16 twist, .22 LR chamber) barrel. However, the barrel has to fit into the receiver opening the .223/5.56 barrel came out of. Also, it has to rest farther back in the receiver than the .223/5.56 barrel so the .22 LR bolt is in the correct place to be tapped by the hammer.



The 9mm barrel, on the right, does not have locking lugs. The 9mm is a blowback, and all it needs is a feed ramp (in the lower receiver) and a chamber.

That ends up making the rifle just a smidgen shorter than it would otherwise be, and if you make an M4-appearing barrel, the flash hider ends up in between the normal 16-inch barrel location, and the 14.5-inch barrel M4 location. (It will still be 16 inches long, or so we hope, just stuffed back into the receiver by about an inch. If this matters in your locale, it matters. Otherwise it doesn't.)

Your bullet now has a proper bore, chamber, rifling twist, and .22 LR performance. You can shoot much longer before you need to clean, and accuracy will not suffer when you shoot tons of ammo. With the correct magazines, you can swap a .223/5.56 upper and your

.22 LR upper on and off the same lower, and things will work just fine. The advantages, as mentioned, are accuracy (you can make it into a smallbore competition-capable shooter, if you wish) reliability and ease of cleaning. The drawback is cost, as you now have an entire upper as your .22 LR investment, instead of just the conversion system and your regular upper.

At this juncture I will point out that if you are like the rest of us, you will not own a single AR, except for a brief period of time. The normal progression is: AR; AR with extra, different upper; then two uppers; a new lower for one of them; and then bouncing back and forth between buying uppers and buying lowers, building ARs



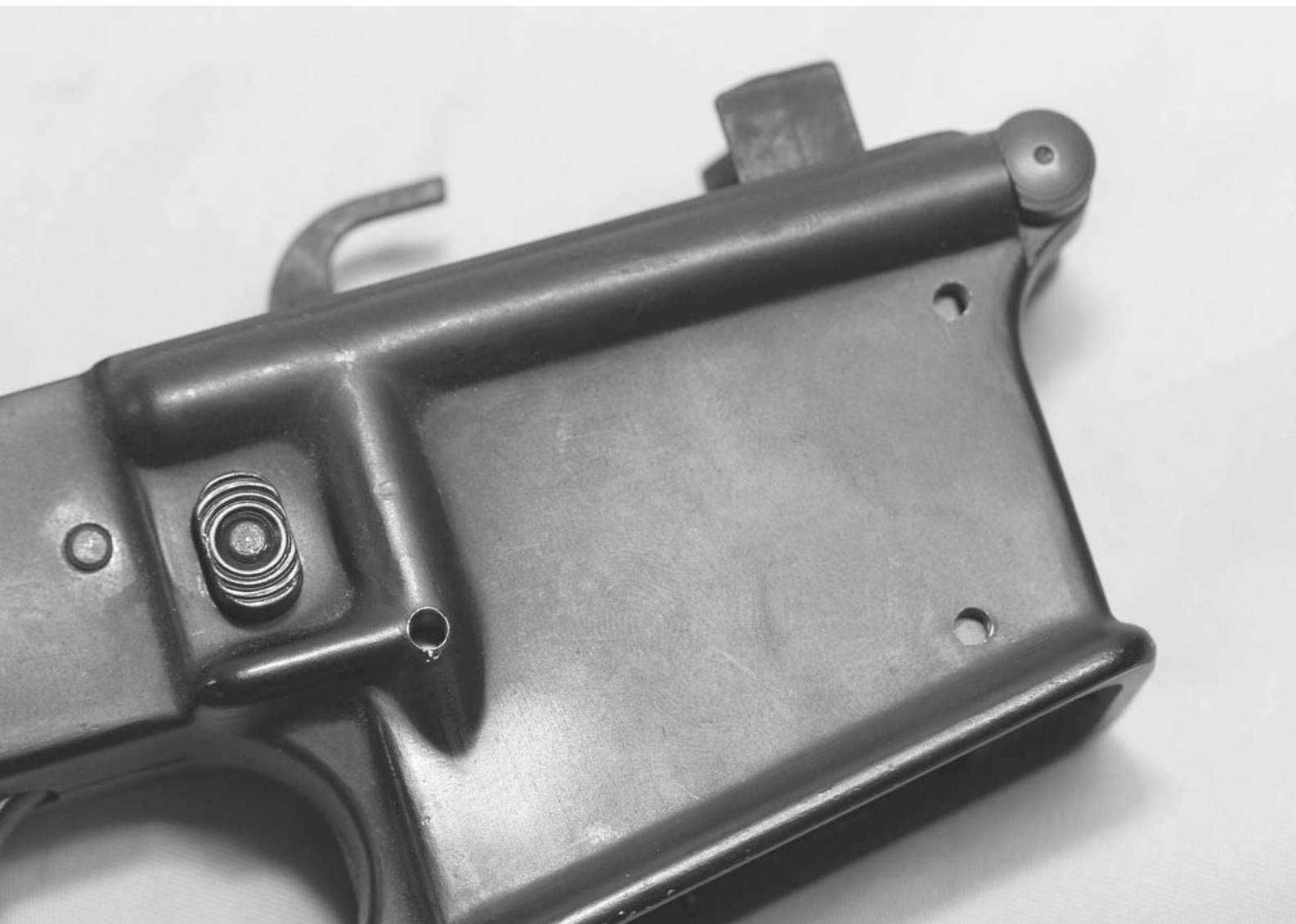
The Rock River 9mm lower is made for the 9mm; it is not a converted .223 lower.

of various configurations, until you reach the limits of your budget, gunsafe, or modesty. For a lot of shooters, that process maxes out at the three or four AR level. Others, those who have EBRD (“evil black rifle disease”), will stop at a dozen or so.

The last method is to give up on the hopeless quest of a single lower and multiple uppers for your AR, and just get down to the business of making each a rifle, and each exactly the way you want it to be. What you can do here is tune the trigger and hammerfall, so you have the trigger pull you want, and avoid the “crashing hammer” method of ignition that the AR has. You see, the hammer is designed to ignite any reasonably intact

primer of any chambered round of .223/5.56. It is a military design, and the military wants 100% function, even if it means an unnecessarily (to the target shooter) heavy hammer fall.

You can also dispense with the buffer spring and weight in the stock of your lower, and replace them with a simple rod of plastic. Or, if you want to move to the head of the class and impress your gun club buddies, replace the standard AR stock with something folding. After all, the .22 LR doesn’t need anything in the tube, not even dead space, so you can make it folding. However, you should consider doing so with a few things in mind: essentially, that your state’s laws may not be as



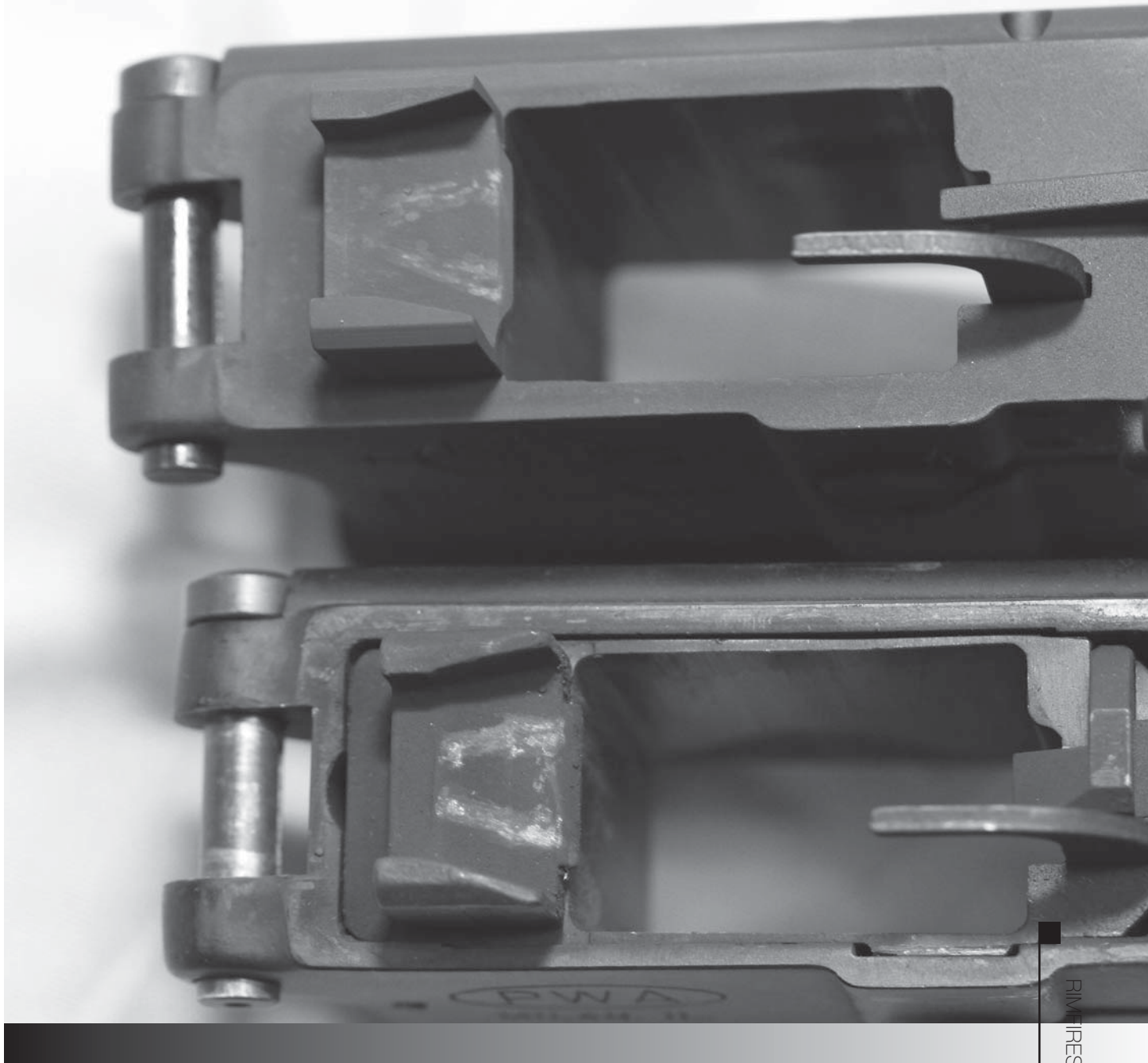
This is how the Colt conversion is done – they drill holes in the lower and pin the adapter blocks in place.

happy with your work as you are. The first obstacle is length. You'll end up with a rifle that is well under thirty inches in length. The Feds don't care: for them the limit is 26 inches, and you get a bonus there: they measure folding-stock rifles with the stock extended. (If they didn't, a million+ veterans and M1 Carbine owners who have the paratrooper stock on their M1 Carbines would hang legislators and Federal agents from lamp-posts.)

However, your state may not be so willing, Mine

isn't – they measure the length with the stock folded, if the rifle functions with the stock folded. So know the law. You will, however, if you go this route, have among the coolest of cool ARs: a folding-stock AR, and one chambered in a caliber that's the ultimate in cheap shooting fun.

Now, you will not finally be in the Promised Land once you have your .22 LR AR built. There is one thing about .22 LR firearms that you have to know: they are



From the top, you can see the adapter blocks of the Colt system and the two-step bolt hold-open.

picky. Sometimes incredibly so. I've seen rifles and handguns that were tack-drivers with one brand of ammo, and jam-a-matics with a different brand. Another rifle/handgun of the same make and model could have exactly the opposite results with those two batches of ammo. The situation is so well-known, and can matter so much, that serious target shooters test their firearms with all available ammunition. Once they find the

ammo that their firearm shoots most accurately, they buy all of that batch they can. Not just the brand and stock number, but the exact same production lot. It can matter. Now, you won't need to buy ten thousand rounds of a particular .22 LR production lot unless you're using your .22 LR AR for smallbore competition. But once you find what your conversion likes and shoots reliably, buy that.



Does CMMG have enough .22 LR conversion kits to satisfy us all? This is just one display bin. Shoot all you want, they have plenty.

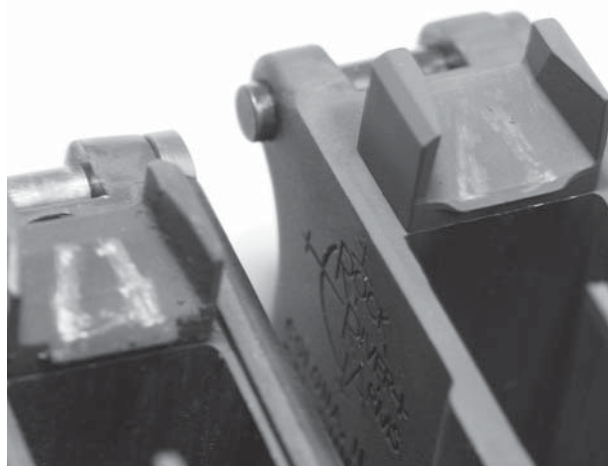


Nothing is cheaper to shoot than a ZZLR. Unless you dry-fire.

The CMMG Conversion

The CMMG .22 LR conversion is an all-stainless steel assembly, comprising an adapter chamber, cycling bolt, spring and guide plate/spring holder. To use it is about as simple as a system can be. You unload your .223 rifle, open it up, remove the bolt and carrier assembly, and install the CMMG conversion in their place. The charging handle works on the .22 just as it does on the .223, but it doesn't travel as far.

Load magazines. The magazines to use are the CMG full-profile .22 conversion magazines. Basically, they are a tough plastic body in the shape of an AR-15 magazine, with a .22 LR magazine built inside. To ensure you don't get them confused with other magazines, the CMMG mag body stops below the feed lips of a .223 magazine, and the



The feed ramps are necessary to get the 9mm cartridge from the magazine to the chamber.



A dedicated 9mm AR is happiest when it has its own, 9mm-specific hammer.

.22 LR mag clearly protrudes above the gray plastic mag body. The CMMG magazine has a bolt hold-open follower in it, and the result is a magazine with a 26-round capacity. CMMG makes two magazine sizes: one that replicates a 30-round magazine, and one that replicates the 20-round magazines, holding 10 rounds of .22 LR.

Slip a magazine in, work the charging handle, flip the safety to fire, and have a blast. Now, since this is a .22 LR, you will have to experiment to find what ammo your barrel prefers, what it shoots reliably and accurately with, and how much shooting you can do before you have to clean things. One worry some shooters have

is “will the .22 LR soft lead bullets clog my gas tube?” Maybe, but it will take a lot more shooting than anyone I know of has done.

The CMMG .22 LR conversion I tested proved to be surprisingly tolerant of ammo. I was hard-pressed to find ammo it didn’t like, and there were a lot of brands that it worked just fine with. If the stainless one is too rich, you can buy the same design in blued steel for \$30 less. CMMG also offers the full kit as spare parts, so if you find something wearing (or if you lose it under the workbench in cleaning) you can easily get spares. Keeping spares on hand is not a bad idea.



When Remington is making a .22 LR understudy to the AR-15, you know the world has changed.

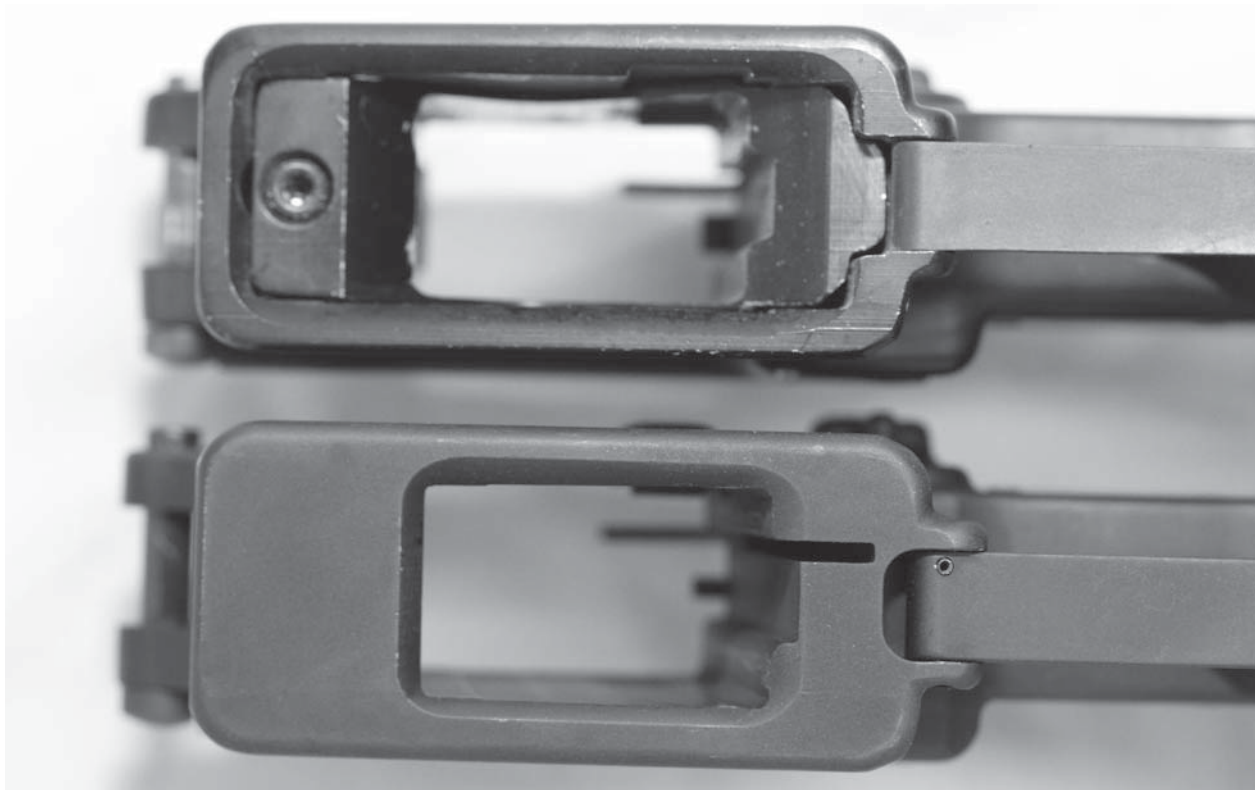
A few things to keep in mind: as the .22 LR really doesn't have a lot of excess energy, you can run into problems with your hammer. A notched-top hammer, like those on Colt rifles, can cause malfunctions. Use a rounded-top hammer. Also, an extra-power hammer spring can cause problems. Ideally, you'd just build a .22 LR-only rifle, and use a lightweight "speed" hammer and a standard spring. Also, charging handles might be an issue. CMMG has already identified the PRI Gasbuster charging handle as a not-happy combo with their conversion. You really don't need to use such a handle on a .22 LR, so swap it over to a rifle that can make use of it.

S&W M&P1522LR

S&W unveiled their .22 LR not as a conversion, but as a dedicated rifle. It looks like an AR, but it isn't an AR. As such, they didn't have the headaches of trying to make something into what it wasn't originally meant to be. Basically, they fired up the CAD/CAM system and starting with a reliable .22 LR-only internal design, built an AR-like enclosure for it. I realize this minimizes the work involved more than it probably should. While AR-specific accessories will fit, the rifle isn't an AR. It is a .22 that looks like an AR.



The Colt uses a shortened dust cover, and a plastic ejection lump, attached to the dust cover door hinge. In all these years, Colt has not upgraded to an A2, A3 or A4 upper. Why? Beats the heck out of me.



The bottom of the two receivers, showing the Rock River one-piece 9mm receiver, and the Colt system, with the pinned-in adapter blocks.

The stock is a six-position adjustable CAR stock. It holds 25 rounds in the magazine, which locks open when empty. It comes with sights, and the railed handguard holds anything that any other AR rail holds. The whole thing, working parts excepted, is polymer, so it is impervious to solvents and you won't cry if you scratch it.

As such, it is more fun that you should be allowed to have (and probably more than is allowed in some states) and will consume ammunition at a prodigious rate. And for those who live in a less-free state, S&W makes a "compliant" model: fixed stock and shipped with a 10-round magazine.



If you see this magazine sticking out of a lower, you know it is a pistol-caliber carbine, most likely a 9mm.

Remington

The AR-15 has become so popular that even companies that never made one are either making one, or making something like it. Remington, “Big Green” in the arms industry, didn’t offer one until recently. And as a .22 LR understudy, they revamped the 597 to look like an AR. They modified it to ride in a chassis that allows Remington to put a forearm on the front and a tele-stock on the back, with a pistol grip underneath. Available as a blued or camo model, it allows someone to have an

AR-like .22 LR for not much more than the cost to build an upper in .22 LR.

Now, the cognoscenti will look down their noses as an “AR-like” rifle. They want an AR – but think about it: the firearms market has been so altered by buyers wanting AR rifles, that a manufacturer who beforehand had never made such a thing, not only makes one, but makes one of their other standard models over to look as much like an AR as possible!



Ruger 10-22

Given a new ensemble and called the SR-22, the 10/22 is just what you think it is: a bomb-proof 10/22 mechanism, in a kinda-sorta AR-15 shell. The end result is that you have a rifle that offers the best of both worlds: you can use any 10/22 part or upgrade that fits, and a all sorts of AR-15 parts and accessories to make your SR-22 the bling package of your hearts' desire.

Pistol-Caliber Carbines

I've talked about these before, but along with the rest of the AR-verse, things change. There still are clubs that shoot "PCC," pistol-caliber carbine. Basically, it is shooting a USPSA handgun match with a 9mm/.40/.45 carbine. The addition of a stock, and in some instances compensator and red-dot scope, can be eye-opening. It was not unusual when we started



it (in fact, my home club was among the first to do it) to find a plain old “C” class shooter who could, with a PCC, smoke a Master Open Division handgun shooter. If the targets were wide-open and close, with not a lot of gun-handling involved, the Open shooter was at an advantage. But, let there be a bunch of no-shoots, or distant targets (distant in handgun terms) and the stock

The big advantage to a 9mm AR, besides low cost and mild report, is that you can use it on handgun ranges and handgun targets. High-speed practice on falling steel plates at 25 yards is more fun than should be allowed.

and more-efficient aiming of the PCC closed the gap in relative skills.

In police work, the traditional shotgun for squad cars was supplemented by the H-K MP5 9mm submachinegun for SWAT. Well, with the shift to ARs for police work, a whole lot of the 870s and MP5s are now no longer being issued. That does not, alas, mean they will be available to the rest of us. First of all, a whole lot of Chiefs are anti-gun, so they’d rather destroy the MP5s than see them sold off, except to another department. And second, a lot of them are not “transferable.” That is, they were not sold via a paperwork route, or in a time frame, that makes them lawful to sell surplus to the non-sworn public. (I will not use “civilian” because the distinction does not exist between police officers and citizens. A civilian is someone who is not subject to the Uniform Code of Military Justice. You’re a police officer, and not in the armed forces? You’re a civilian, too.)

Anyway, they aren’t available to us. However, some departments, while they are buying ARs in 5.56, are also buying ARs in 9mm. Huh? What? Why? This takes a bit of explaining. First, the shift from the MP5 to the AR. One big reason is HK themselves. To say that their marketing is inefficient is to be understating the fact. A couple of examples: one department I know of ordered replacement extractor springs for their MP5s so they could replace the old ones on their SWAT teams. They waited six months, and received one. A lone spring. In the words of the still-steaming team leader: “For what



they charged for the spring, and the shipping, they might as well have gold-plated the thing, like a Saddam Hussein special.” Another, an individual officer, waited

for the trigger module for his HK sidearm, to change it from a decock version to a cocked-and-locked version. Nine months, and he’s still waiting. With service like



that, changing from 9mm to 5.56 involves a change in brands, too. Now, Colt is no paragon in such matters, but at least with an AR the department can find

Unless you live someplace where they allow SBRs, this is what a 9mm carbine looks like.



If you want to shoot cheaply, you need to get a .22 LR conversion. Here is the stainless CMMG, which pays for itself in almost no time.

someone, someone capable, to do the work they need in a timely fashion.

There are a number of departments where the Chief is not so hot on issuing a 5.56 rifle. Many feel the 5.56 is “too over-penetrative” and “too powerful” for street use. Actually, indoors, the 9mm is a worse police barrier-penetrating round than the 5.56. But in many cases, the Chief, a political appointee, “knows what he knows” and cannot be talked out of it. In a lot of such instances, the Chief doesn’t want rifles of any kind, but is still sensitive to charges that he is not concerned enough for officer safety. Hence, the pistol-caliber carbines.

What we’re also seeing is something that seems new,

but isn’t: range problems. A lot of police departments have to rent range time to qualify in the winter. (Or at all.) Or, they share a facility with a bunch of other departments. Indoor ranges have problems with durability. Dirt takes rifle hits in any caliber, and can be shoveled or plowed back up into a pile. Steel, however, takes it and takes it until it cracks. Or, if you use something too powerful, it gets dented, holed and turned to scrap.

Rifles indoors are loud, but in the northern belt of states, indoors is the only place you can shoot in the winter. I know, I know, “real men” shoot regardless of the weather. OK, your semi-annual qualification is



The Chiappa dedicated .22 upper, which arrived almost too late to include.



The Chiappa does not have a .223-case shaped adapter “nose” as it has a proper .22 LR chamber on the back end.

scheduled, and the day before there is an ice storm. Once you get the roads cleared of accidents, do you really want your officers/deputies skidding around the range, loaded rifles in hand? Even if they were not qualifying with lethal weapons, having them out there invites injuries. Who wants to have the budget hammered due to overtime, to make up for the medically-induced manpower shortage? You? I thought not. So, indoors you go. And one other thing: a line full of officers, 5.56 rifles in hand, is so loud half your officers develop a flinch, and a quarter fail to qualify. Good job there, sport.

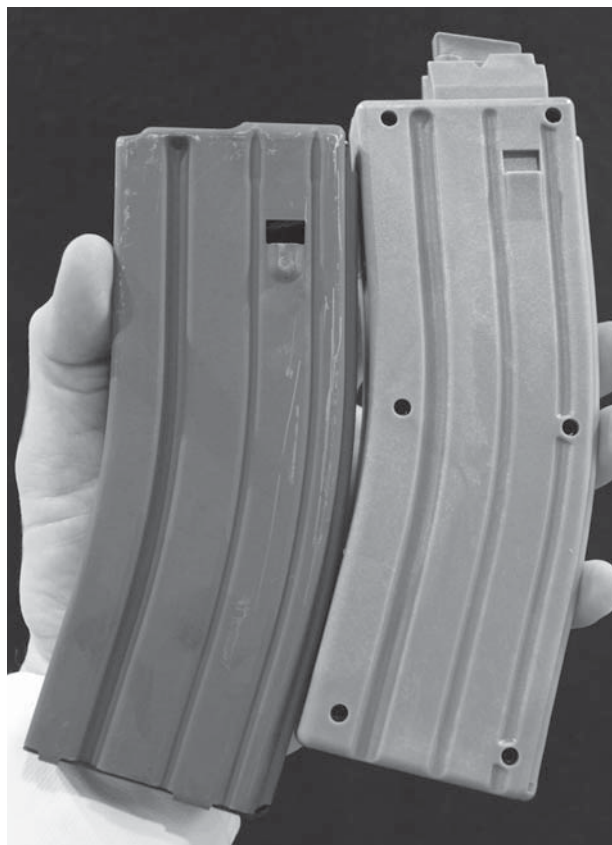
What the 9mm AR does for a department is simple: it allows indoor, wintertime practice and qualification shooting, and if the range/department had a low or no-lead requirement, then the officers can shoot with lead-

free and/or frangible ammo. And 9mm, regardless of the type, is cheaper (type for type) than 5.56 is. If those are all advantages, then why not .22 LR? Lead-free ammo aside, it can be summed up in one word: verisimilitude. The noise and recoil of a .22 LR are not at all like a 5.56. This is good for primary marksmanship training, but not so good for qualification. While the 9mm is a lot less loud, its felt recoil is jolty enough that if you can shoot a 9mm correctly, you can shoot a 5.56 correctly. Defending a .22 LR qualification indoors would be touchy, while defending a 9mm qual would be easy.

So, it is now becoming more common for a department that has adopted the M4 in 5.56 to acquire a handful of 9mm ARs for indoor, wintertime practice and qualification.

However, unlike the .22 LR, you do not have a choice in conversions. You can't simply slip a 9mm bolt into a rifle, load magazines, and get on with it. You have to have at the very least a dedicated upper in 9mm, and a conversion magazine adapter to temporarily build a lower as a 9mm rifle. It is far more satisfactory to have a purpose-built, dedicated 9mm rifle to use for indoor practice. (And PCC competition.)

There are other calibers but the best for this job is the 9mm. It is relatively cheap, low in recoil, easily reloaded if you do your own ammo, and the magazines are easy to acquire and hold a lot of ammo. For a long time, the 9mm SMG, in the form of the HK MP5, was the SWAT long gun. Dissatisfied with the performance of the 9mm, the FBI requested HK make a new model, one chambered in 10mm. Oh, baby, that had to be a real fun blaster. And a powerhouse, at least by handgun standards. However, for the same size, weight and recoil, you can have a 5.56. Yes, in many applications the 10mm would be fine, or perhaps even better. But once the FBI dropped the idea of using the 10mm, the MP5/10 fell by the wayside.



The CMMG .22 LR magazine looks very much like a .223 magazine, and fits the standard mag well.

However, the idea of a pistol-caliber carbine, and one in calibers bigger than 9mm, has always been attractive. I had an Olympic Arms in .45 that was quite fun. (Sold it, darn.) But it had severe limitations: the magazine held only about fourteen rounds (modified UZI mags) and it was very sensitive to overall length and bullet shape. Which has been pretty much the case for all conversions: they all have been compromises, and as such, they demonstrate severe shortcomings.

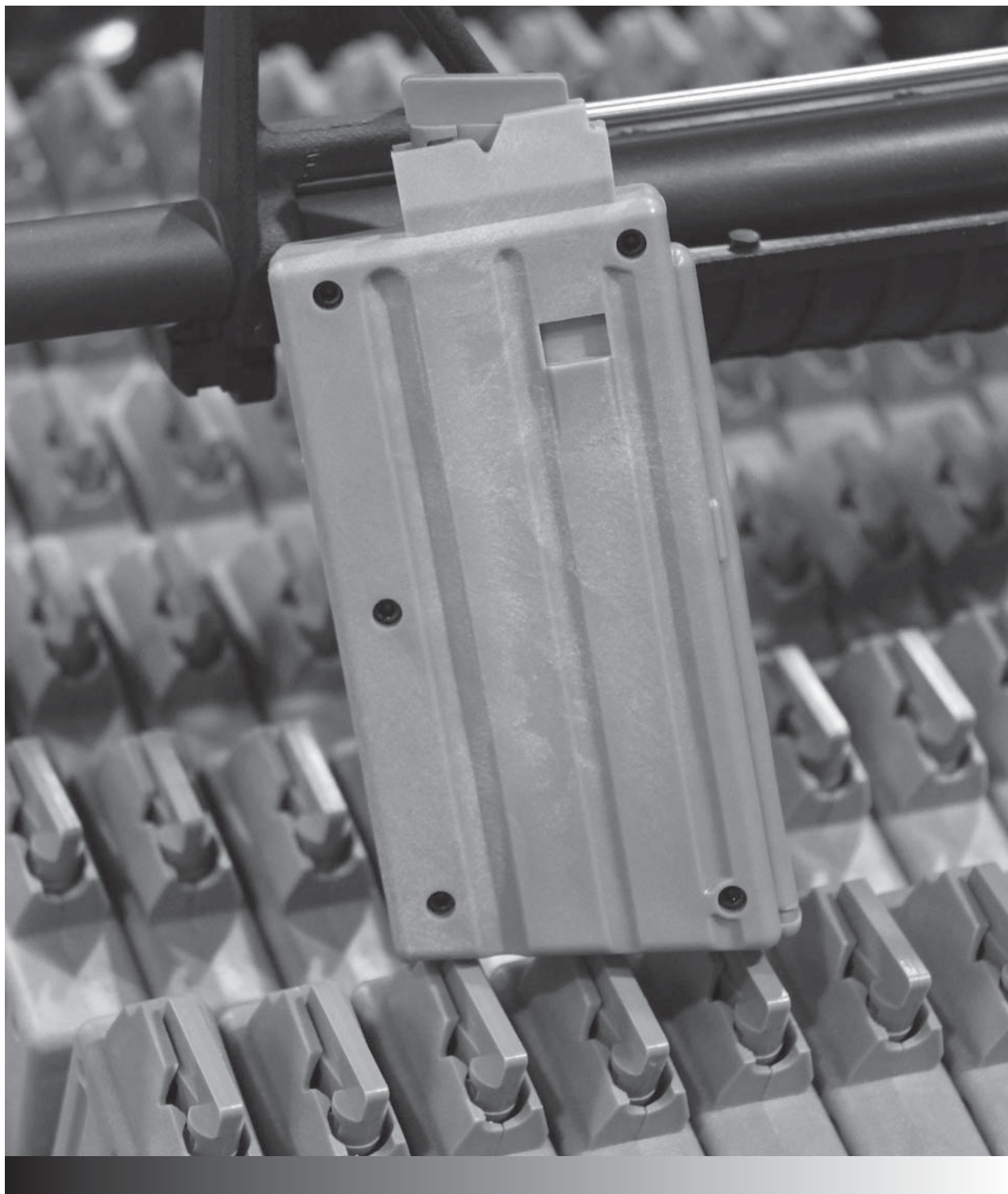
Colt

The Colt 9mm carbine was the first. I still recall reading Frank James's article on the then brand-new Colt 9mm carbine, which was offered in the early 1980s. While reliable, it was reliable in the context of early-1980s ARs, which is to say, not very good by today's standards. And, having had a chance to look into it since then, and talk with people, and build and use my own, it demonstrates the faults of the approach.

First of all, the magazine: a modified UZI mag. I found out later why this particular magazine: it fit the receiver without extra cutting. (Dear god, of all the reasons to go with!) Other magazines would have worked, and probably worked better, but only if Colt had been willing to modify the receiver to accommodate their extra width. Then, another problem cropped up: the UZI feed path differed from the one that the Colt required, and to make the carbine work with the magazine they were stuck with, Colt had to modify the feed lips. They had to release the cartridge sooner in the feeding cycle, so it had time to release, tip up and move forward. So far, so good. However, the modified lips produced an undesirable side effect: "Old Faithful" magazines. Take an UZI mag, load it and drop it. You'll be able to pick it up, stuff it in an UZI, and use it. Do the same with a Colt magazine, and perhaps 20 of the 32 loaded rounds will spew out on impact. Heck, sometimes you'll be loading them, and the magazine will spit out three or four rounds you've already loaded.

On the good side, they do lock the bolt open when empty.

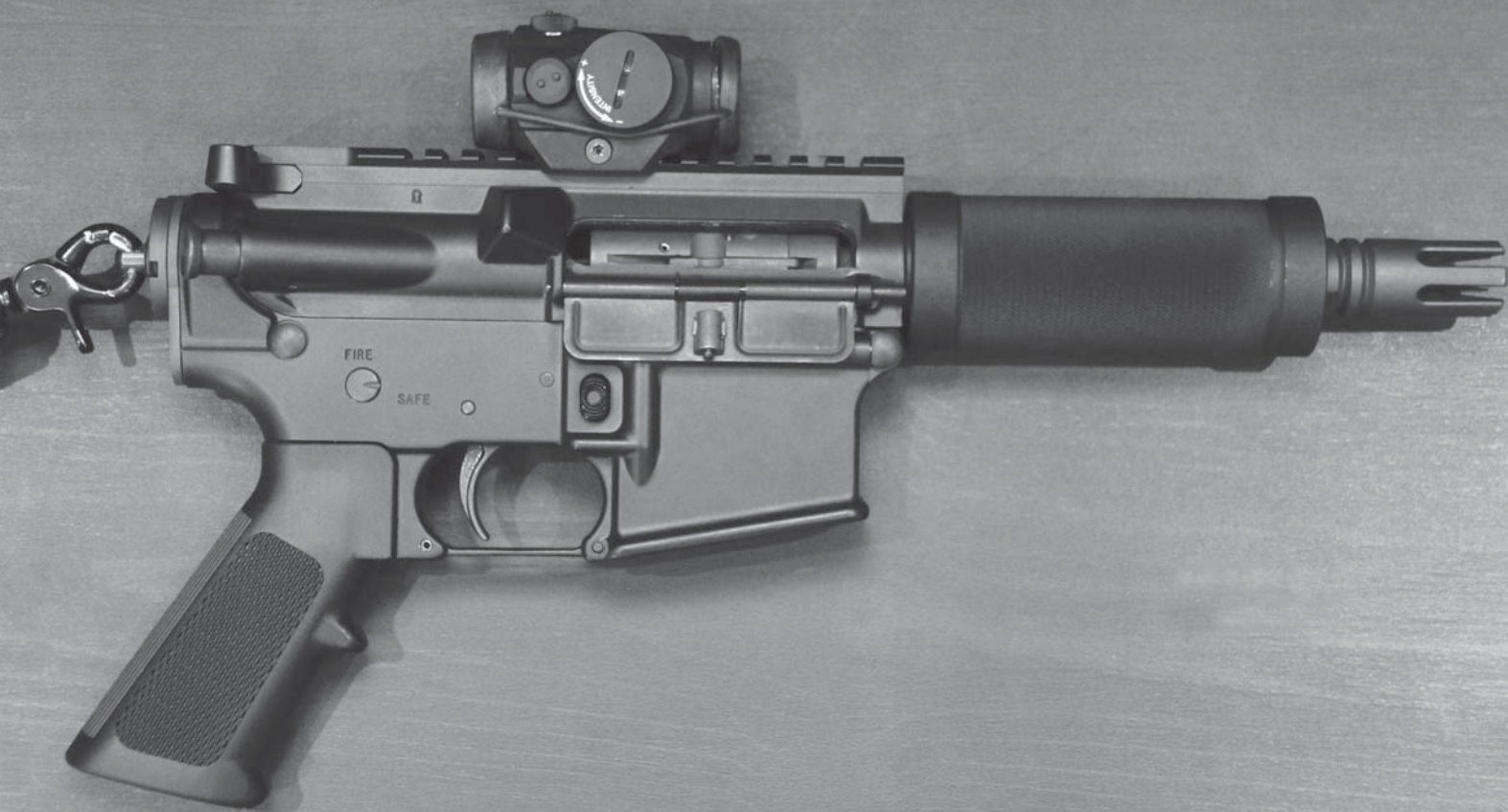
Now, having decided that they wanted to use a lower with no extra cutting, they went and made a 9mm receiver out of...a lower with no extra cutting. They used the regular 5.56 magazine well broach to cut the mag well. Which meant that an Uzi/Colt 9mm magazine would rattle around inside, if you could even get it to lock in place to begin with. So, to make the magazines



And if you want something smaller, there is a 20-shot clone, holding ten rounds of .22 LR.

fit they pinned in two adapter blocks; one front and back. This required extra fixtures, to hold the lower for drilling, to hold the lower while the pins for the blocks are held in place, and then the blocks themselves.

And, as part of the adaptation, Colt went a step further. When I acquired a conversion kit (the parts from a clapped-out Colt SMG that a department had used up) I found the blocks also had recesses drilled in them, and



And as a final inducement to .22 LR fun, Doublestar makes a .22 LR AR handgun. Lots of practice, without the ear-blasting report of a .223 handgun.

stiff little springs inserted into the recesses. The blocks were pinned in place and then spring-loaded to stay located. I mean, think about it: the fit and assembly was typically so sloppy that Colt had to use internal springs to keep things in place? What kind of system was that?

Actually, one that worked reasonably well, if you were willing to overlook the magazines spurting ammo at odd moments. Colt sold a bunch of them. I can only imagine that they sold them to agencies (they were not long available in select-fire; the Hughes Amendment to the Firearms Owners Protection Act of 1986 took care of that) who were tired of the customer service of HK, and viewed Colt as perhaps a step up in that regard. Colt also didn't make them on a regular basis, only setting up the tooling to make a batch now and then. With a year or

more between production batches, it is hard to keep the assembly staff up to speed. I can't imagine that helped the fit and reliability of the 9mm carbines.

In any case, finding them was never easy. But, when you did, and once you sorted through magazines to find those that your gun liked, they were reliable, accurate, soft-shooting carbines that were a lot of fun on a USPSA range.

Then, when the interest picked up a bit (and I can take some credit there, as my gun club was one of the first to start running PCC matches and proselytizing them through the USPSA) CProducts began offering magazines. Theirs are a lot better, and more reliable than, the Colt ones. Combine them with a reliable gun, and you're on to something.



Rock River

When I heard Rock River was going to be making 9mm ARs, I had just one question: “will you be making them on pinned lowers, or will you broach them just for the 9mm magazine?” The facial expressions of Steve Mayer of Rock River Arms were interesting to watch unfold. First, a little bit of annoyance at being cornered.

Then, a momentary flash of disgust at the thought of a pinned receiver. And then a big smile. “Why, we’re broaching it just for the 9mm, with an integral feed ramp as well.” And so it was. I spent some time looking over a Rock River lower before ordering one to re-build my 9mm carbine onto. Now, you can buy a complete 9mm rifle or carbine from Rock River if you want, but



One magazine from a handgun like this and you'll be happy for a 9mm AR.

it, and I had put a lot more ammo through it since then. So, I rang up the guys at M&A Parts. There, Andy and Bill were more than happy to track down a 9mm 16-inch barrel for me, chambered for Colt, deep in the back of the warehouse. (There are two 9mm barrel/chamber designs; the Colt and the Olympic Arms. If you're ordering a replacement barrel, be sure you know which you have. The Colt has a carrier that looks like it lacks a bolt. The Olympic looks like a snouted carrier.)

It was a snap to remove the old barrel from the upper, plug in the new M&A parts barrel, put it on the Rock River lower, and have a new 9mm carbine. I could finally take my old receiver with the pinned-in blocks and turn it back into a 5.56.

M&A barrel, CProducts magazines, Rock River lower, and the result is a reliable 9mm carbine. On the Colt, it was not uncommon to see "stub" rounds. Somehow, in feeding out of the magazine, the round would nosedive, and bury its tip against the feed ramp so hard that it just stops. The Rock River has not done that yet, even when I use the old Colt magazines I have.

As for accuracy, the M&A barrel is light-years ahead of the old Colt, with its bazillion rounds downrange. This does not turn the 9mm carbine into a sniper rifle. You can easily get hits at 100 yards with one, but the wind will not be your friend. In our patrol rifle classes, we run the students on the same 300-meter qual course the US Army uses. At 300 meters, it has to be a near gale-force wind to drive the bullet from an M4 off of the target. However, the 9mm at 300 yards (stop laughing) not only has a drop of three and a half feet (105 inches) but a 10 mph wind will drift it 39 inches. So, a slight wind that you wouldn't even bother taking into account (unless you're a sniper) with a 5.56 is enough to drift you completely off the target with a 9mm.

Of course, you aren't using a 9mm for its long-range capability. You're using it because it is fun, inexpensive, not oppressively loud, and you can practice with it in places where you could not with your 5.56.

What are you waiting for? .22 LR or 9mm, get a move on.

since I had all the parts already I'd re-build mine. (And, of course, I have a reputation to maintain: I build guns.)

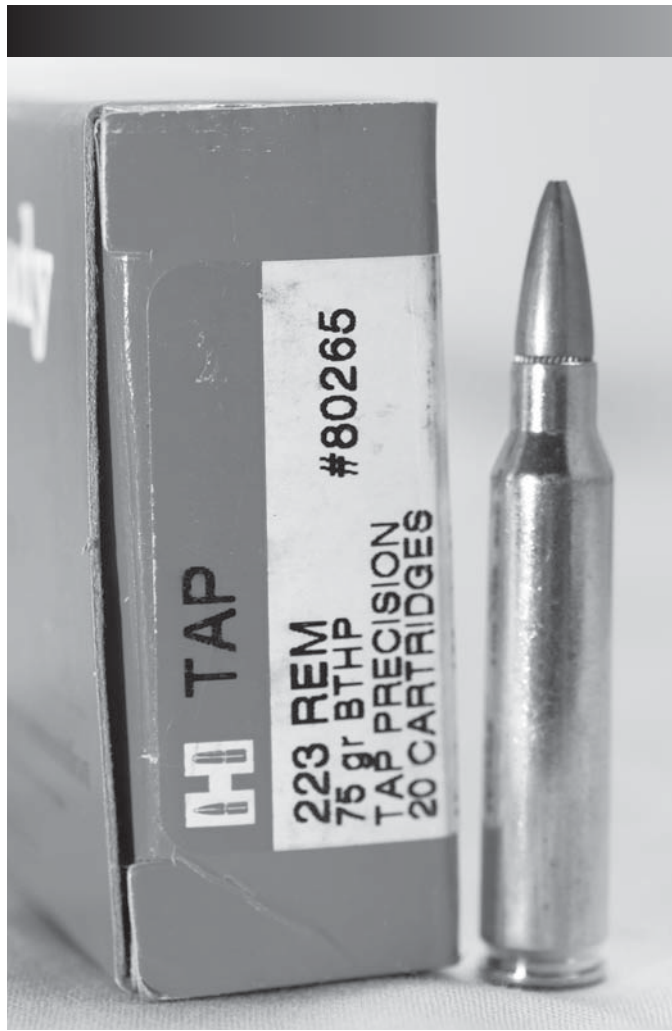
I had the old upper, and the magazines, bolt, etc. I had the old SMG barrel, with its welded-on flash hider to make it long enough, but that was getting old. After all, the police department that had owned it had scrapped it out due to age and use. The barrel was tired when I got

CHAPTER 14

NEW CALIBERS



The basic lineup: .223, 6X45, 6.8 and 6.5. All of these are double-stack magazines, and thus have reasonably large capacities. The fattest, the 6.5, still fits 20 or so in a regular-sized magazine.



The newest trend in .223/5.56 is heavy bullets, 75 and 77 grains.

I was tempted to name this chapter the “carnival of calibers” but decided not to, just to avoid confusion. And it would detract from the serious nature of our endeavor. Oh what the heck, let the carnival begin!

The original caliber for the AR-15 wasn’t the .223/5.56, it was a slightly smaller cartridge. The .222 Special delivered the kind of performance that the designers wanted, which was basically a 50-grain bullet at under 3,000 feet per second. The Army, trying to keep the AR away and keep the M14 in the running, kept moving the goalposts. Finally, they insisted that the bullet used had to penetrate a steel helmet at a distance farther than their own research had indicated soldiers fired on opponents. The special got stretched and

boosted, until the 55-grain FMJ was at 3,100 fps.

And there it stood, until the mid-1980s, when the SS109 came about. That was intended for use against swarms of Soviet infantry in Western Europe. What, there never were swarms of Soviet infantry in Western Europe? Musta worked. Seriously, the expectation was that the Soviets would roll West, and the NATO allies would be faced with Russian, East German, Polish and who knows who else mechanized infantry piling out of their BMDs, BMPs, and BTRs, lining up and assaulting the NATO positions. They expected to face lots of targets, and not only armed ones, but armored infantry. So, the push was for armor-piercing performance, leading to the SS109 and the later M-855, with a 10-grain steel penetrator tip inside.



Not only is it fabulously accurate, but the heavy weight means it is going to overturn and break up in the target.

The new rifle also received a new barrel twist, one turn in seven inches, to fully stabilize the SS109 and the tracer as well. Only the tracer really needed the new twist, but the military approach was/is a “one size fits all” approach, so there it was. I had a talk with Mark Westrom, CEO of Armalite about that, and he remarked that it would cost more to prove to the Army that a 1:9 twist was better than it would cost to re-barrel every rifle in inventory to 1:9.

Fast-forward to Somalia, the infamous “Blackhawk down” incident. There, good shooters (Rangers, Special Forces and Delta operators) spent a long time, and a lot of ammo, shooting at people who in many instances didn’t fall down when hit. To everyone’s surprise, smallbore ammo designed to penetrate to a fare-thee-well failed to do more than create simple perforation wounds on unarmored opponents.

So the system stayed quiet until we were in another shooting war, and reports came back. This time, they came back too often, and too frequently, and over a long period of time, to be ignored. As a result, the now well-known Mk 262 load was developed. What it does is simple: it takes advantage of the too-fast twist of the

M16A2 and M4, the 1:7 twist, and loads a 75- or 77-grain bullet in the case. The longer bullet is less stable than the shorter, 62-grain M855, and thus overturns on impact or soon after.

The next step was a refinement, the Mk 262 Mod 1, which included a cannelure in the bullet. The cannelure is a place to crimp the case neck into, but it also strategically weakens the bullet. When it begins to overturn on impact, it then breaks apart at the cannelure.

Stop wringing your hands. Lots of bullets overturn, tumble in the parlance, and lots of bullets have cannelures. And some have both, such as the old loading, the M-193, the 55-grain load from the Vietnam era.

The Mk 262 carries its speed better and offers longer-range performance. In fact, it offers too much long range performance, at least as far as hitting is concerned. You see, it puts the Army on the horns of a dilemma. The load is so accurate in some rifles that a skilled shooter can hit his target far beyond the effective ballistic “thump” of the bullet. Yes, a 77-grain bullet is gonna hurt, but when it has dropped to the performance of a .22 rimfire magnum, it gets tough to justify it.

What’s worse, not all (in fact, very few) of the soldiers who might get their hands on it can actually make use of its range. Yes, I’d rather poke a .224 hole through a bad guy at 700 yards, than let him walk off unscratched. The awful truth is, the Army doesn’t teach enough about marksmanship to let soldiers do that. The qualification course goes out to 300 meters. There is no feedback, so if you nick the edge of the target you get scored the same as if you center-punched every one. Beyond 300 meters is a mystery, and many soldiers will be told to not shoot at the 300-meter targets, to save the rounds. That way, they can use the extras to make sure they get this close in. After all, with 20 targets coming up, and 20 rounds, you need only a dozen hits to pass. So, if the far targets are chancy, save your shots for the sure thing.

Which is a less than reassuring skillset to have, wedged behind a boulder in Afghanistan whilst being thrashed by a tripod-mounted PKM from 800 meters out.

No, the Army spends time teaching marksmanship skills to only a very few. They haven’t time, being too busy with a whole raft of mandated courses they have to teach first. But that doesn’t keep shooters from dreaming. The first dream was to stretch the existing round more. The longest-lasting and most-desired is to go back to the very beginning.



The 6X45 is a way to get heavy hunting bullets (or light varmint grenades) into a .223 case. If your state doesn't allow .22s for hunting, this is your caliber.

6X45

One of the first wildcats for the AR, and other rifles, it is a simple one to effect: basically take a .223 case with a neck not work-hardened too much and pop a 6mm neck expander stem through it. The result is a .223/5.56 case with a neck that will hold a .243-inch bullet instead of a .224-inch bullet. As a deer-hunting round, this offers some prospects. In a bolt-action rifle, unless it is one scaled for the .223 and the .223 alone, you can gain useful case capacity by loading the bullet longer. The longer-loaded bullet doesn't protrude into the case, and you end up with as much capacity as the .223 had.

However, we have not that luxury in the AR-15. The magazine dictates just how much length we have to work with, and no more. That, combined with the fixed location of the case mouth, means we cannot use a longer, more aerodynamic bullet to keep the speed up downrange. It also limits the weight we can use, as

a heavier bullet decreases case capacity (the room for powder) and thus gives us a double whammy in velocity loss: more weight and less powder.

However, improved powders have changed that somewhat since the 1960s, the last time anyone looked at the 6X45 in rifles.

The modern look is interesting, as it combines with the sudden increase in the AR, with a mild deer-capable cartridge. There are states that do not allow .22 rifles for deer hunting. However, a 6mm such as the 6X45 is allowed. So, a 6mm loaded with softpoint bullets, say an 80-grain bullet at 2,800, is plenty good enough to drop a whitetail. Now, since we can't always depend on the velocity printed on the box, and a lot of ARs for hunting would be handier, in a 16-inch-barreled carbine, we'd be talking more like 2,650, but that is still good enough to drop any whitetail who ever walked the American continent, given a well-placed shot.

The 6X45 has been around since at least 1965 as a recognized wildcat. In all that time, it didn't get much traction. Why des it now? Two things: new powders and new bullets. In 1965, if you could push an 85-grain bullet much past 2600 fps, you were doing great. And the bullet so-pushed was a plain old "cup and core" softpoint, with not much ability to retain weight or shape and penetration. Now, we have powders that can push the same weight at 2800 fps, a more useful velocity. And the bullets being pushed, bonded-core softpoints, all-copper hollowpoints, will retain weight, penetrate and work like they are much bigger bullets than they are. At the other extreme, varmint bullets are much better than they were in 1965. They are more accurate, fragile, and able to be pushed to higher velocities. If you want warp speed, a Hornady VMax of 58 grains loaded to 2950 fps is your choice, and if you want a bit more range even if it means giving up 75 fps, then their 65-grain VMax at 2875 fps will vaporize varmints at distance.

All of which makes the 6X45 a much more attractive hunting/varmint cartridge than it used to be. However, there are some touting it as a replacement for the 5.56 as a defensive load. There, I have to part company with them. The 6X45 as a deer cartridge works well because of the new generation of expanding bullets. In a military context, expanding bullets aren't allowed. Yes, police and non-sworn taxpayers can use expanding bullets, but the fewer offerings in the 6X45 make it less useful. I know, I know, it's like the getting-your-first-job conundrum: You have to have experience to get a job, but if you haven't had a job, how are you going to get experience?

If people don't buy the 6X45 for defense, how can they expect the ammo makers to load defensive ammo for it? Not my problem.

The 5.56 gets around the "no expanding bullets" problem by using long-for-their-weight bullets that tumble and break. The 6X45 is boxed in in that regard. Any bullet you can push fast enough to break up is too short to be broken. And any bullet long enough to be breakable is too heavy to push to a speed where it breaks. The pilots among us will talk of the "performance envelope" which is a graph of speed and altitude, turning radius, range, etc. Operating "in the corner" or "on the edge" means going right up to the limit. The U-2 worked that way. It traveled so high, where the air was so thin, and so close to the limits of

its ability, that pilots could not make turns that were too tight. To do so would mean the wingtip of the inside wing (the wings were very long for its size) would slow down, and fall below the stall speed of the aircraft. The sudden drag of the stalling wingtip would put the U-2 in a flat spin, which was usually not something the pilot could recover from.

The 5.56 is operating in a corner of its performance envelope: there is just enough room to push a 75- or 77-grain bullet fast enough to make it break up when it tumbles. The 6X45 does not have that room.

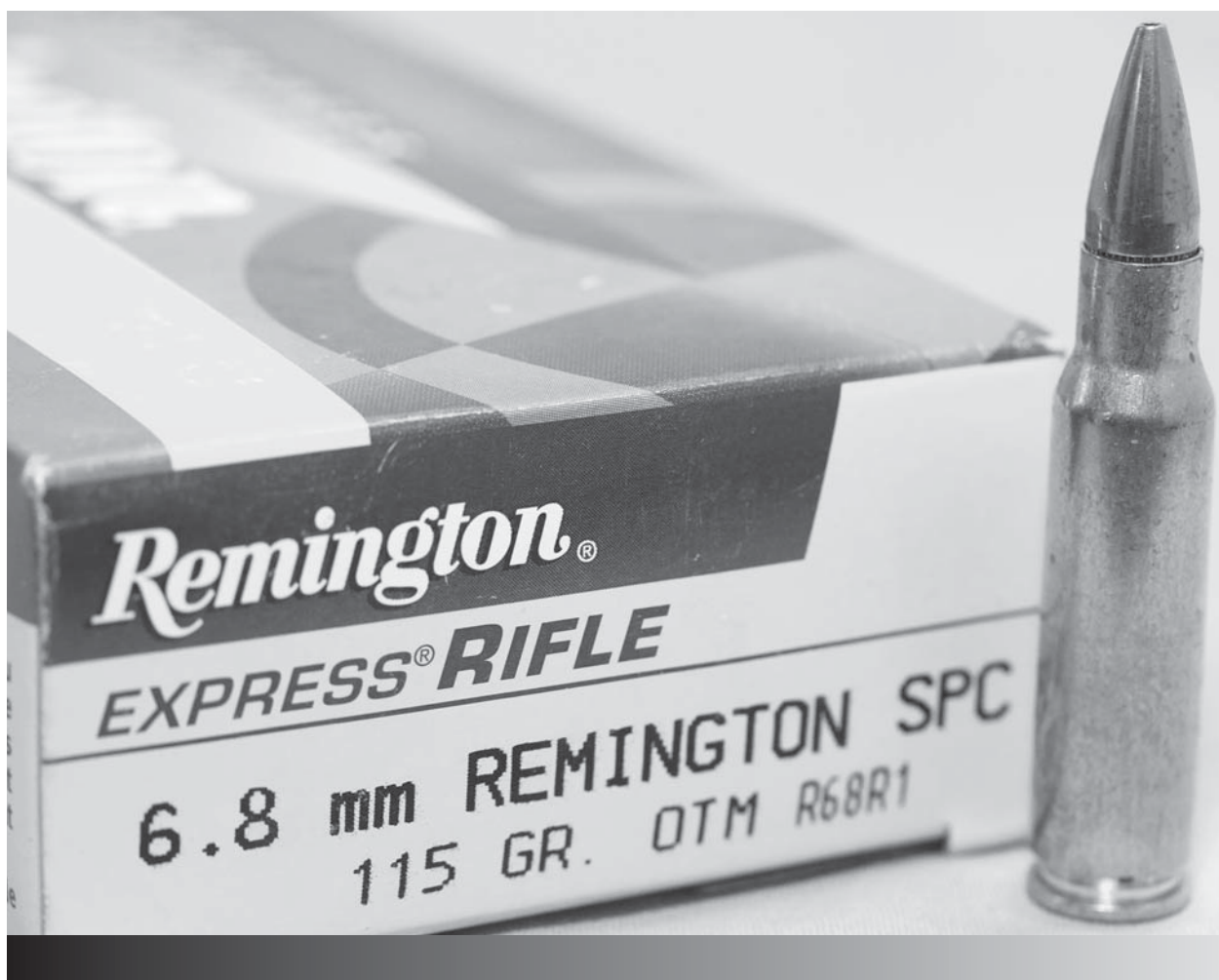
So for the military it isn't a viable option. But for hunters and the non-military defensive user, it offers many advantages. And the biggest of those is that to convert a rifle to 6X45, you need only a new barrel. The bolt and magazines of your 5.56 will work just fine, thank you very much.

6.8 Remington SPC

The "six point eight" erupted on the scene as the replacement for the "anemic" 5.56. The idea was to use a case with more volume than the 5.56, but not one that required a wholesale redesign of the rifle. The case settled on was the old .30 Remington, with some changes. Now, this is not anything new. Back in the mid-1980s, I was fiddling around with new designs. One I came up with was a 25mm grenade for a self-loading grenade launcher, for use in the military. I wanted to come up with something besides the single-shot M79, or the bulky and awkward M203. So, I did some thinking, made some drawings and turned sample cartridges out of aluminum rod. However, lacking both a loading lab to make sample test shells for further experimentation, and the licenses to do such work, I had to leave it at drawings and solid-aluminum dummies. However, while I was doing that I happened to have not one, but two customers' rifles chambered in .30 Remington come through for work.

In the course of repair and test-fire, I had to track down some .30 Remington ammo. As I was looking as the ammo, I happened to have a 20-round AR magazine nearby. Just out of curiosity, I snapped the loaded round into the magazine. Hmmm, pretty close, but too long. I figured I could make changes, and perhaps even re-barrel a rifle. A glance at my elderly lathe made it clear I had not the equipment to hold the tolerances to turn down a barrel or barrel blank and fit it to an AR.

There was also the matter of timing. Back then,



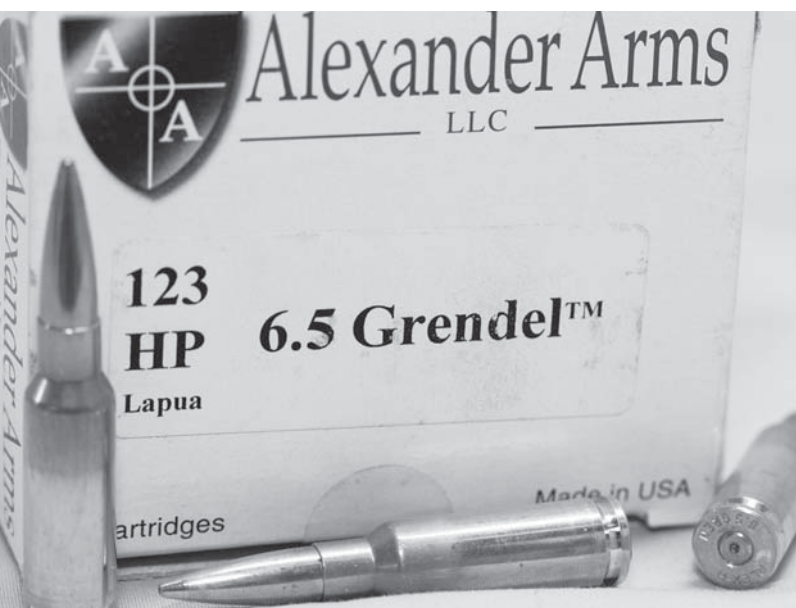
The 6.8 Rem SPC is derived from the old .30 Remington case, shortened, necked-down and made to work in an AR.

no one would have been interested in a replacement cartridge for an AR that didn't do what a .308 did. If I couldn't make "Major" there was no point to the experiment. The .30 Rem Short (as I had mentally named it then) had no chance of being boosted to Major, not with the powders we had back then. So I shelved the idea. Now, I make no claim to being first, only or the cleverest on that subject. I'm just pointing out that it is durned difficult to come up with something that is truly new.

The 6.8 was not meant to make Major. It was meant to produce the most "oomph" out of an M4 carbine, with the least amount of modification to the package, and the most commonality with existing gear. As such, it requires a new barrel, a new bolt (which is essentially the old bolt with a bigger boltface) and new magazines.

The original plan, I'm sure, was to make it work in existing magazines. Well, that just couldn't happen. What I am sure of is that if you were willing to invest enough computer simulation time, you could come up with a 6.8-ish cartridge that stacked and fed from unmodified AR magazines. I'm also sure that by the time you got done modifying the cartridge case to permit such feeding, you'd have lost enough case capacity that you didn't have performance any better than the 6X45.

So, the 6.8 got new magazines. And what is the performance that makes new bolt, barrel and mags worth it? At the low end of weight, we're talking a 90-grain JHP at 2800 fps. Moving up, the "sweet spot" seems to be in the 110 grain range, where a 110 JHP or OTM can be pushed just short of 2600 fps. Now, for those who are accustomed to a screamer 5.56 load



The 6.5 Grendel is a high-performance round, meant to be loaded with a super-aerodynamic bullet.

like the XM-193 (a 55-grain FMJ at 3200 fps) or the Mk 262 Mod 1 (a 75- or 77-grainer at 2800 fps) the 6.8 may not seem like much. But with the 6.8 we get back that corner of the performance envelope that the 6X45 gave up. You're now pushing a heavy bullet fast enough that it will upset, or, when it tumbles, does good work moving sideways.

Now, as with the .223 vs. the 5.56, there is the original, and the later 6.8. The original was designed as a collaboration between the Special Forces NCOs who had the idea and the Remington engineers who did the detail work, drawings, etc. The .223 differs from the 5.56 in that the lead-in to the rifling on the .223 is shorter and steeper than it is on the 5.56. The reasons are thus: the .223 is meant as a varmint cartridge, and there accuracy is prized over all else. The 5.56 is a combat cartridge, and reliability and pressure control are prized. So, the longer freebore and gentler leade of the 5.56 allows for heavy bullets (like tracers) and for a dirtier operating environment.

The original 6.8 was designed more along the lines of the .223. Soon after, experimenters changed it. They lengthened the freebore and the leade angle was made more gentle, plus one more change; rifling twist. The original twist is/was 1:10; the new uses a 1:11 twist. With a greater freebore, gentle leade and slower twist,

the 6.8 II is better able to handle pressure than the older design. It also makes the bullets just a bit closer to unstable, although still accurate, and this enhances terminal ballistics.

Well, with all that, the government didn't adopt the 6.8. In fact, the NCOs who pushed it got into hot water. You see, good ideas are valued by large organizations as long as good ideas come as a result of the system. Good ideas that are not a result of the system are heretical and must be quashed.

Is the 6.8 a good idea? You bet. As long as you are willing to make the investment in the new gear, it is a very good idea. Magazines are now readily available from CProducts, PRI and others. One you won't see, or so the guys there tell me, are PMags in 6.8. The fatter cartridge just won't stack properly inside a magazine tube made of polymer. At least, not with the thickness needed for durability. Sure, they could make it thinner, but who wants a fragile polymer magazine?

Magazines fit in mag pouches, reloading presses work on 6.8 just as they do any other cartridge, and the bullet diameter is a common one, so no problem there.

In all fairness, one big problem for the military is how much commonality there is. For us, the fact that it is all so close is a big advantage. For the military, it's a big disadvantage. You see, you can load 6.8 in regular mags. Or you can load 5.56 in 6.8 mags. And either will fit in the other's mag well. I haven't seen a 6.8 try to digest a 5.56, but I've seen a 5.56 try to chamber a 6.8. So, if the military is going to adopt it, they have to make a clean sweep. So, if they want to try the 6.8, to see how it works, they have to make sure that the troops going into Carjackistan are all armed with 6.8s and nothing but 6.8s. and anyone who comes to support them must have 6.8s. The supply system has to be hyper-vigilant about ammo, otherwise a chopper will arrive at a dusty FOB, kick out a pallet of crated ammo, and take off before the locals get a chance to have a go with their RPGs. And the troops will find the ammo is 5.56, not usable in their 6.8 rifles.

Worse yet, the Army can't just re-barrel existing M16/M4s. The system isn't set up to allow a rifle, M16A-whatever, clearly marked on the receiver as a 5.56, to be chambered in anything else. There would have to be, at the very least, a new designation, and the altered rifles so marked. It would be better if they were new ones, cosmetically modified in some way to make them clearly different.



In the Alexander Arms cases, the 6.5 is loaded with Lapua bullets and uses small rifle primers.

For the military, changing to 6.8 is not a “bolts, barrels and magazines” change, but a billion-dollar cost. For what? A bit more terminal effectiveness? That’s what radios and artillery are for.

6.5 Grendel

Unlike the 6.8, the 6.5 came from the fertile mind of an inventing genius who wasn’t trying to invent a better jihadi-busting round. Bill Alexander is one of those guys who can’t look at a part, mechanism, cartridge or other design without thinking of ways to improve it. The 6.5 Grendel is a simple-appearing cartridge. To define it in the simplest and most Bill-discounting terms, it is a 6.5/7.62X39 Ackley Improved. That is, it is the Soviet 7.62X39 case, necked down to 6.5, and with the shoulder blown out and sharpened, and the case walls straightened.

Which grossly diminishes the work necessary to refine the dimensions of each. To give you one example, the case neck: how long? A shorter neck means a more-forward shoulder, and thus greater case capacity. More capacity means more powder, leading to more velocity, and greater range. However, a shorter neck also means a less-pointy bullet, and thus a lower



Les Baer is now having ammo loaded for his 6.5 rifles by Black Hills.

ballistic coefficient, leading to velocity drop at range. A shorter neck also means less tension on the bullet, and a greater likelihood of bullets loosening on feeding (being rudely shoved up the feed ramp) and a blown case from bullet setback.



The Les Baer/Black Hills loading uses Hornady VMax bullets and small rifle-primed cases.

Some like to compare the 6.5 to the 6.8, and start an argument as to which is “best.” They are more alike than they are different, despite the cases being so different. The two each start bullets in roughly the same velocity range, with bullets of similar weight, and the close-in performance is similar. (And both sides will hate me for saying so.) The difference is in the long-range performance. A 6.8 bullet of 110 grains that starts at 2550 fps reaches the 500-yard line with 1515 fps and the 1,000-yard line with 980. A 6.5 Grendel, launching a 123-grain Lapua Scenar at 2650 fps, reaches the 500-yard line with 1890 fps and the 1,000 yard line with 1304 fps still on board.

For pretty much the same shoulder-thump, you get far better downrange performance, once you exceed the “typical combat” ranges of 300 meters.

The 6.5 Grendel requires the same parts be exchanged to create it as the 6.8: bolt, barrel and magazines, although none of the three is cross-compatible between the 6.5 and 6.8. You pick one or the other, not something that does both.

Starting out, Bill Alexander patented and trademarked the cartridge and components, because



Wolf makes 6.5 Grendel in brass cases, and this is really good practice ammo if you do not need the extreme performance of the Lapua bullets.

the performance and accuracy were the big advantages of the system over other calibers. To devise something that performed and then allow anyone who wished to, to make one, and potentially diminish its performance and reputation, was not what he wanted. He has since licensed the round and designs to others.



Reloaders, fair warning. Wolf cases use large rifle primers, so sort your empties, if you have Wolf and other sources of ammo.

Do you need a 6.5 (and when has need ever entered into the discussion)? Well, if you want to do long-range precision work, and don't want the bulk and thump of the .308 in an AR-10 type rifle, yes. You can shoot to distance with a 5.56; the NRA High Power ranges have proven that. However, at 600 yards the 5.56 is not exactly the hammer of Thor. If you want to reach out and have some tap left, then the 6.5 is the next step up.

.30 Gremlin

Ok, just to go full circle, at the USPSA 2009 Multi-gun Championships, the USAMTU shooting team arrived with yet another new cartridge. First: Multi-gun? In the early days of 3-gun competition, we simply slapped together a match by putting up a handgun stage, a rifle stage and a shotgun stage. Later, we expanded by having multiple stages for each discipline. Well, that wasn't adrenaline-inducing enough for some, so the stages got combined. In a Multi-gun match, you'll have stages that require you use two or all three of the guns. Use a handgun to shoot the

close targets, shoot empty or unload, pick up your rifle and shoot the far targets. That sort of thing.

The .30 Gremlin is the 6.5 Grendel necked up to .308, loaded with 125-grain bullets and boosted to make Major. All of a sudden, we have a .30 Major round that fits a standard AR-15 platform and doesn't have to be chambered in an AR-10-sized rifle. Of course, the drawbacks are severe, and thus probably limited to competition, but you have to admire the ingenuity. Limiting it to a 125-grain bullet means no tumbling and no fragmentation. Of course, it is still a .308-inch bullet at Major, and as such a big step above the 7.62X39, which has always been the exemplar against which the 5.56 has been proven to "fail."

Capacity is exactly the same as the 6.5 Grendel, and the Gremlin uses Grendel magazines.

Does this round have a future? Sure, as a competition round. For those who wish to shoot 3-gun or Multi-gun matches and want to shoot Major without going to a full-sized AR-10 based rifle or some other platform, it holds promise. Other than that, I doubt it.



The 6.5 is derived from the 7.62X39, in much the same way a Corvette is derived from a Model T.



30 Remington AR

The 30 Remington AR makes Major, too, but goes about it in a different manner. Starting with the case from the .450 Bushmaster, Remington necked it down to .308-inch, shortened it, and altered the rim diameter to make it non-compatible with .450 Bushmaster bolts and thus preclude someone from cobbling together a .30 Remington AR out of spare parts. The resulting cartridge

feeds from an AR magazine, but it stacks singly, not staggered. As a result, capacity is greatly reduced in the magazines, but that isn't a problem Remington cares about. You see, the idea was to make the rifle a suitable deer hunting rifle, and one in .30 caliber, a bore size desired by many deer hunters.

The result is a case with the internal capacity of a .30-30, but since it operates at a higher chamber pressure than that levergun cartridge, the .30 Rem



Remington, making an AR? Yes, the world is a new place. This is a modern hunting rifle, chambered in .30 Remington AR.

AR offers greater velocity. Also, being magazine-fed, it uses pointed bullets instead of flatpoints or roundnose bullets like the .30-30. The two loads Remington offered originally were both 123 grains: an FMJ for plinking/practice, and a Core-Lokt softpoint for hunting. Both listed at 2800 fps, out of a 20-inch barrel.

For tactical or defensive use, the round offers nothing of interest. Capacity is low, performance is in an odd niche of weight and velocity, and the bullets aren't of

interest to the tacti-cool crowd. What it does, however, it does brilliantly: it offers the deer hunter who isn't interested in tactical black guns a self-loading hunting rifle of more than deer-hunting performance, and what's more, such a rifle comes from a maker who has no previous history in military guns. (At least not from the point of view of the deer-hunting crowd.)

If you show up in deer camp with an AR made by a big name military or tactical/defensive company,



In the middle, the new Remington .30 for their AR. This is meant to be a deer-hunting cartridge, not a long-range sniping cartridge.



you'll get stared at. But, the same rifle, with the name "Remington" on it, brings instant acceptance. Or, at the very least, cloaks you in respectability as you argue the virtues around the wood stove before Opening Day.

The rest of us? An interesting curiosity. Oh, when I first heard of the round, it was at a Remington seminar, and my question was "Aren't you worried about shooters confusing it with the old .30 Remington round?" The



With this, both the DNR officer and your hunting buddies will be assured you are not hunting with an under-performing deer cartridge.

answer was no, they weren't. they didn't feel there were enough shooters who remembered it to cause a problem. So far, it seems they were right. A shame, since the old .30 Remington, in the Remington Models 8/81 and



While it looks like it is a double-stack magazine, It is really a sort of a "stack and a half" magazine. As long as it feed reliably and holds five rounds and no more, it has done its job.

14/141, was a very reliable deer-busting round – and a brainchild of the great John M. Browning, no less. To be so forgotten, by the very inventors of it...oh, the indignity!

MAGAZINES

CHAPTER 15



If you train or practice, you'll need more than just a couple of reliable magazines.



A batch of Fusil magazines, ready to be abused in a class.

A lot has happened since we last talked about bullet-holders. The AR-15 magazine has never been so prevalent, available, affordable and reliable. And never have shooters desired to have more of them on hand.

The AWB of 1994, which expired in 2004, left a lot of shooters with a bad taste in their mouths; the very idea that magazines could be restricted, controlled, and vilified was anathema to them. Once the law sunset (an uncommon thing in the American political history; usually, once a law is enacted, it is there forever, or until the people rise up and in effect threaten to hang legislators from lampposts unless it is changed), shooters went on a buying spree. For a while, it was almost as hard to get hi-cap magazines after the ban ended as it was while the ban was in effect. But, once the makers got caught up, prices settled down and shooters stocked up.

Also, new makers got into the act. People like Brownells, CProducts, Magpul and Lancer started making magazines. Enjoy – because sooner or later, the people who hate us will take another bite at the apple.

Magpul

Magpul magazines are product-improved magazines made of polymer. The idea was used before, but not as well. Unlike the previous OrLite or Thermold magazines, the Magpul mags were altered for better function and made of a polymer that seems to defy the laws of physics. It works even after being run over, and it probably doesn't even suffer from being run over. Fully loaded, dropped on the lips at -30°F, it doesn't break or lose rounds. They are inexpensive and fit regular mag pouches.



The Fusil mags have a lanyard loop on the baseplate, in case you want to add pull strings or something.

Available in colors, with or without windows, and in 30 and 20-round capacity, they have become the new standard for magazines. “As good as a Magpul?” is a question any new magazine is received with.

One area where Magpul exceeded the expectations of all is in the cover. Unlike the rubbery covers of old, which merely kept dust off, the Magpul covers snap securely in place. They won’t rub off. Also, when snapped in place they compress the stack of rounds, pressing them away from the feed lips. So you can store them fully loaded, and the feed lips will not experience any tension while so loaded. Now, you don’t put the mags with covers in your load-bearing equipment. The covers have an angled edge, meant to be used to rip off the cover in times of great need. No, you store them loaded in a bag, box, something other than load-bearing gear.

Tango Down

Instead of take-apart magazines, Tango Down ARC magazines are permanently assembled. The springs are rust-proofed, so to clean a magazine you simply unload it, immerse it in hot, soapy water and cycle the follower up and down. Let it dry (in the sun, not in a drying machine with the laundry) and you’re good to go. The magazines come in two styles: with or without the gasket that provides a dust and dirt seal around the magazine well lip.

The seam of the two halves, around the middle, can be a problem in some magazine pouches, but that is easy to fix: just use a slightly different mag pouch.



**Yes, we need lots of magazines.
And if we're to test them properly,
we mark them. Mark yours.**



**Tango Down and their magazine that
is not to be disassembled.**

Lancer L5

A plastic magazine with a set of steel feed lips moulded into the tube, the Lancer L5 mags are hell for tough, and they also found a way around the limits of smoke-color plastic. The usual clear or semi-clear polymer is not tough enough to be used as a magazine. At least not without the usual approach, exemplified by the Steyr AUG: make the thing bulky with stiffening ribs. The steel inserts provide the strength needed, while the magazine tube is semi-transparent, and you can see (if the light is good enough) how many rounds you have left.

The magazine base is also rubber-covered, to protect it from the impact of being dropped, and to cushion it if you use the magazine as a single-point shooting rest.



A paint pen works wonders. Here are a batch of PMags getting ready for a class. They all worked fine.

Fusil

The Fusil magazines are, like the HK, all-steel. They are not, however, the rest of the details of the HK magazine; they are not as heavy, not oversized, and not ferociously expensive. They are two stamped half-shells, stamped in the good old USA, and then welded together. Now, being steel, they will rust. You want the durability of steel, you're going to have to accept that risk. However, they won't rust quickly, and even the slightest bit of attention will forestall that oxidation problem and keep them as good as new.

CProducts

CProducts magazines are made of stainless steel, with multiple, perhaps even excessive inspection, gauging and testing. They are the exact shape and contour of a USGI magazine, given a black Teflon coating, and unless you look at the floorplate, or tap it to gauge the sound of the impact, you'd be hard-pressed to tell they were steel and not aluminum.

CProducts makes a full line of magazines, in a host of calibers and capacities. Likely, if you have it, they can provide a magazine to feed it.



CProducts makes magazines, and darned good ones. They make stainless and aluminum, and in a host of calibers, from 5.56 to 6.5 and 9mm, and others in between.



CMMG makes magazines, too. Braided springs, stainless steel followers: rugged and reliable.



The PMag magazine they had to design for the HK 416.

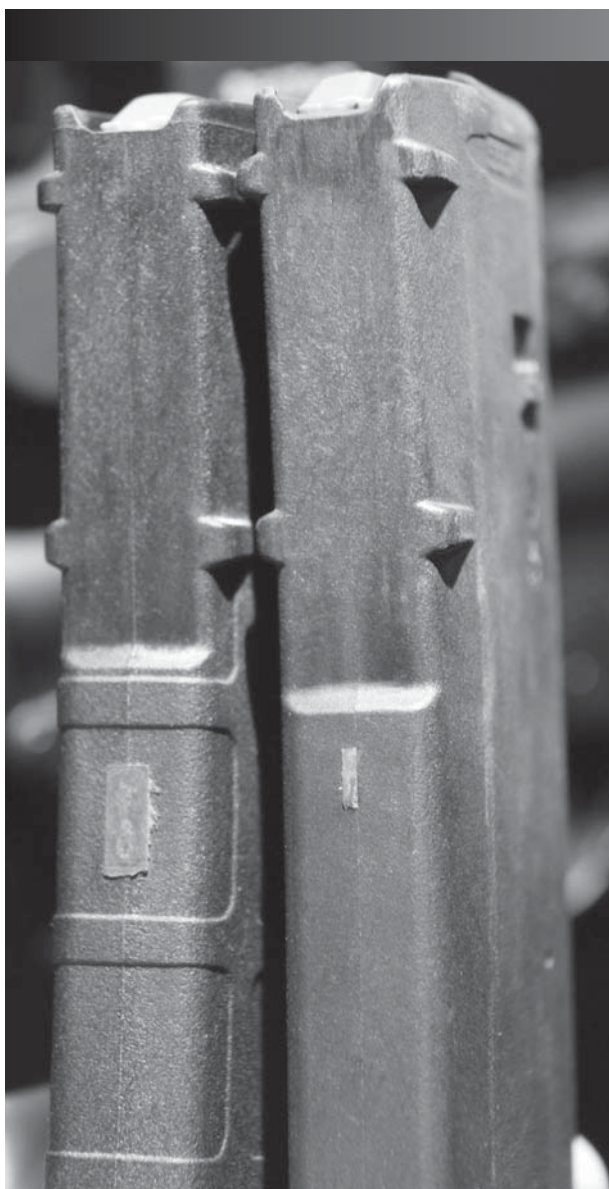
Brownells

Brownells makes USGI magazines. Not USGI-type, but actual, real-deal magazines for the government. They won a contract to supply the government with magazines, and the excess production goes into their own inventory, to be sold to us, the taxpayers and shooting public. The magazines undergo the full battery of mil-spec testing gauging and QC – and if that isn't good enough, you can have the tubes and followers with a stainless spring which is less likely to corrode in extreme weather than the chrome-silicon ones. The magazines have either a green USGI follower, or a Magpul-designed anti-tilt follower. In any combo, in any color (you can get them in tactical colors, too), you won't be disappointed.

PRI

PRI doesn't make a wide range of magazines but what they make, they make in a very important area: they make 6.8 Remington SPC magazines. Why is this important? Because the more people who are willing to make magazines for a niche caliber, the more likely we are to be getting good magazines. Nothing improves the breed like competition. If only one company made magazines in XYZ caliber, we'd be at their mercy. Oh, and the mags they make are good ones.

Despite the greatly improved quality of magazines you still have to test, mark and maintain your magazines if you expect them to serve you well.



While regular magazines won't work (many brands, anyway) in the 416, 416-specific magazines will work (mostly) in ARs.

Testing a Magazine

The process is simple: five rounds. Load a magazine with five rounds. Shoot them. It should feed reliably and lock open. Does it fall free (you can catch it in testing) when you press the button? Good. Do this a couple of times again, and call it good. Load it fully up and then fire five rounds. First, does it lock in place fully-loaded? If not, you should pass on that magazine, or that brand, for your particular rifle. Once in place, fire five rounds. Safety on, remove the magazine, Load five rounds, repeat.

The two tests are checking for separate things. The first one is to see that the magazine locks the bolt open, but also to check that the magazine spring isn't too short and hasn't been weakened. A short or weak spring will fail to lift the stack near the end.

The second test checks for mag tube swelling, where the fully-loaded magazine tube swells and binds in the mag well. It also checks for over-travel, that you have enough extra room to load up 20 or 30 rounds, and still seat the magazine. Last, that the spring is strong enough to lift a full stack of rounds fast enough to feed reliably.

Once you have a stack of reliable magazines, you want to keep them. I use paint pens, or spray paint and stencils, to mark them. You can use your initials, number them, a special secret code, a logo of your own design, whatever.

After that, maintenance. When stripping magazines to clean, do them one at a time. I may just be superstitious here, but the thought of gutting a pile of magazines, and then getting the springs, followers and baseplates back onto different tubes just gives me the willies. I'd rather that reliable magazines get their own internals back after cleaning, not the internals from another tube. But that's just me.



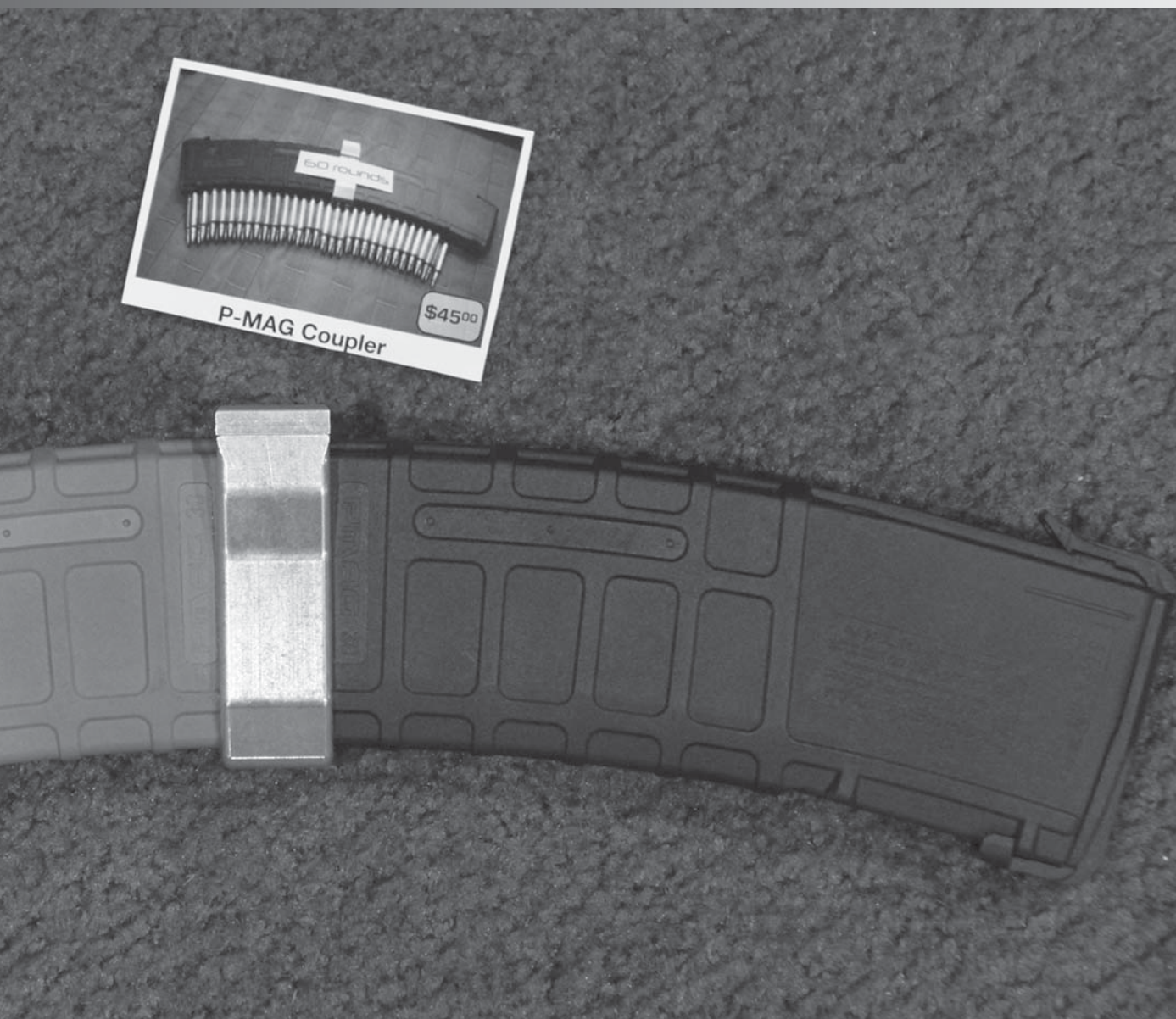
And as if that wasn't enough, HK made the G36 with its own magazines, too. What is it with these guys?



While you have them apart, there are a few things you should not, *must* not, do. The first is mess around with the feed lips of the magazines. I love the guys at Brownells, but their magazine feed lip adjustment tool is a bad thing to have in your toolbox. If you have it, you'll be tempted to use it, and that's just asking for trouble. If a mag works, it needs no tuning. If it doesn't, tuning

won't help. Ditch the mag, buy another, and don't give the old one a second thought.

The other thing to not do is to stretch springs. You do not improve a spring or lengthen its life by stretching it. If anything, you decrease both. Springs are designed to work within a given amount of movement. If you exceed that movement, you work-harden steel. Take a paper clip



California Competition Works makes a magazine coupler for the PMag, one that turns a pair of Pmag30s into a huge 60-round stick. You need this for 3-gun competition, and for when the zombies come.

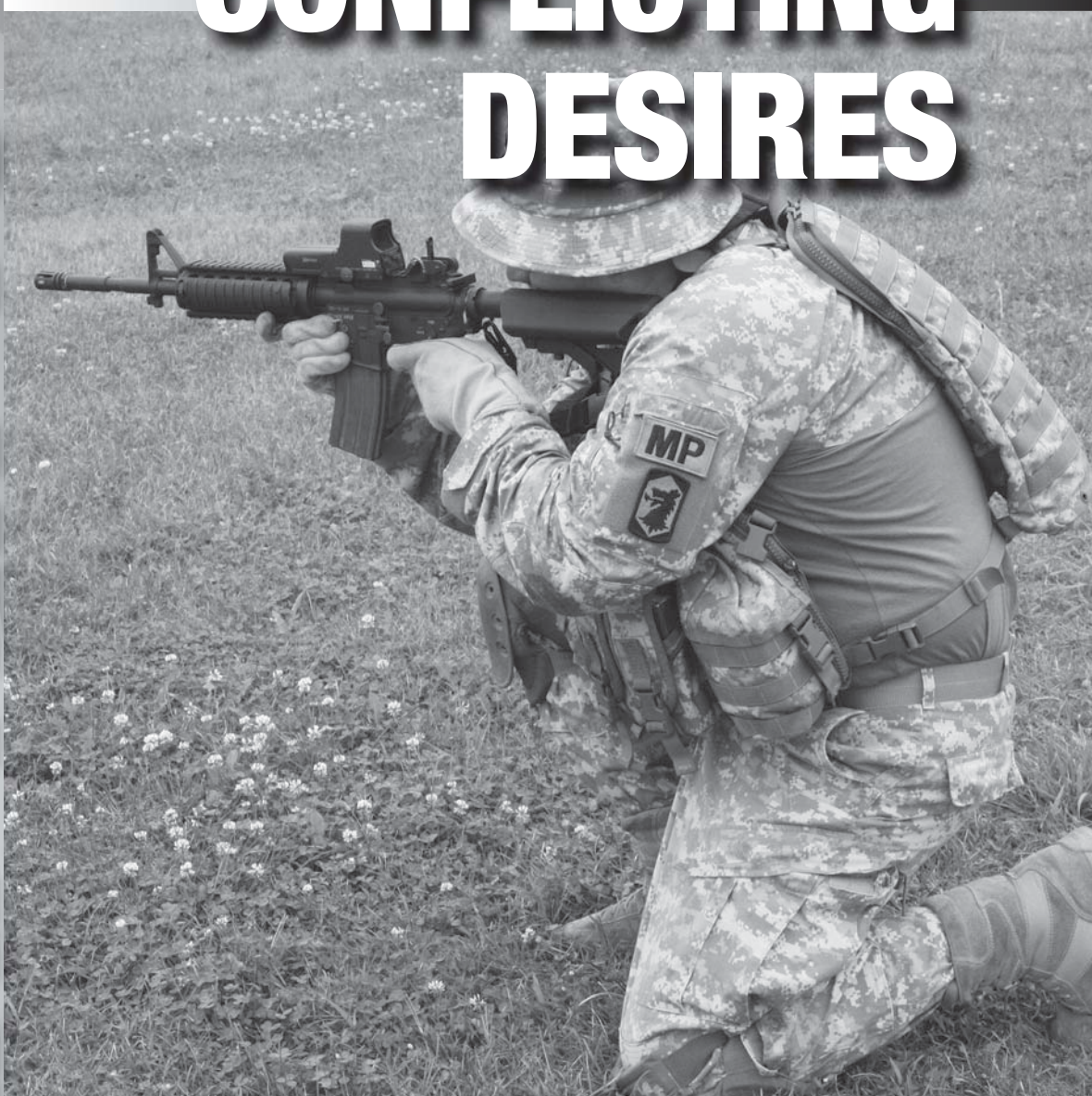
and repeatedly bend it. You'll break it at that point, due to work-hardening. Stretching a magazine spring is much the same thing. Springs weaken due to loading cycles. Take a spring and flex it (within its limits) and it springs back. Do that a million times, and some springs will quit. Take the same spring, compress it (again, within its limits) and leave it there. When you come back, and

release the load, it will be as if you cycled it once, for a second. No difference between that and two years.

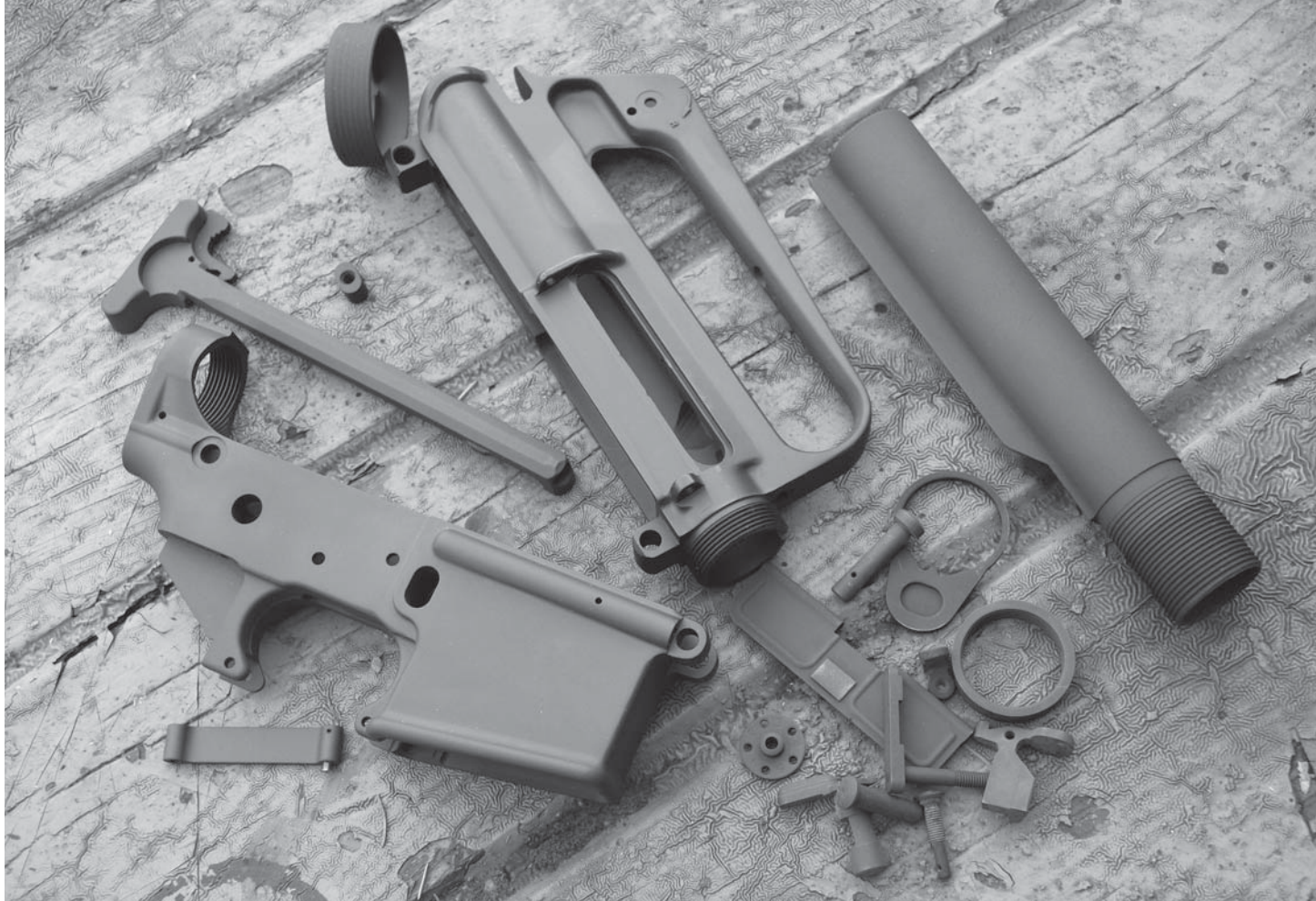
Springs do not need to "rest," so don't worry about leaving a magazine loaded. If it is a good magazine, it will still be a good magazine when you need it.

CHAPTER 16

RETRO'S, HIGH-TECH AND CONFLICTING DESIRES



Old school or state-of-the-art, the AR gives you that choice.



The beginnings of the project: a Nodak lower and a Colt upper I happened upon.

The modular nature of the AR-15 means there is a conflict, or at least, a divergence, in our path: what kind of AR do you build? Obviously, if you have a number of possibilities, and a group of shooters, you'll see them build any and all combinations. Sort of a variation on the old joke about economists: if you ask ten economists to predict the future, you'll get eleven answers. However, unlike economists, you can't seriously suggest building all the variations on one rifle. Given the Brownells AR builder and a credit card capable of taking the heat, what do you build? Something not on the builder page. Actually, two, three or more of them.

The two biggest divergences are the Retro movement and the high-tech build. The Retro's want to build an AR that as closely as possible emulates the M16 of Vietnam, the earlier the better. What we think of as "the M16" is actually, in almost all cases, the M16A1. That is, triangular handguards, skinny 1:12

twist barrel, fixed stock, and A1 sights. What a lot want to build is even earlier: a three-prong flash hider instead of the birdcage, an upper without a forward assist, and in some instances a lower lacking the magazine button "guard/fence" and other details. A Retro rifle built on an upper and lower without those is known as a "slickside" (and in some instances, just the upper) and they can be hard to do.

The other approach is to build on an upper and lower set that are not forged, and have enhancements to the upper and lower design. The build is often done with a premium upper as a start. You see, there are gear makers who do not want the hassle of making lowers, who are fully capable of making an upper better than anyone. And some started there and expanded to lowers as well. The high-tech builder is not at all concerned with things being mil-spec; in fact, many view mil-spec as archaic and a hindrance to performance.



The Retro Build

The first part of a Retro build is to decide what kind and when. The current lowers are all “A2” lowers, with reinforcements at the buffer tube loop, enlarged

radii on the front takedown pin studs, and “fences” around the mag button and mag well top. These were all added to make the A2 more durable than the A1 had proven to be.



To make a truly Retro rifle, you have to change all that. You can, as some have done, re-machine and hand-polish the surfaces to remove the extra metal. But, you'll have to have it re-anodized afterwards, and if you screw

Instead of Retro, how about all high-tech, improved and better?

**Forward assist, no ejector
lump, A1 sights. All cool.**

it up, your lower is thrashed and ugly. Why remove this extra stuff? Because when the mainline manufacturers (primarily Colt, but others a bit later) made the switch to producing A2 lowers, they did not save the forging dies to make A1 lowers. Or, more likely as a first step in the transition, I'd bet they re-machined the A1 dies to allow for more metal. At the risk of insulting those in the trade, to make an A2 die set out of an A1 die set, all you have to do is get in there with a die sinker and machine out a bit more metal in the areas you want thicker in the final product.

So I'd bet that most, if not all, of the A1 forging dies in use in the mid-1980s got converted to A2 profile. And as they wore out, they were replaced by dies made from the start as A2 dies. So today, if you want an A1 lower, you have to have A1 forging dies made from scratch, either by going the CAD/CAM route, re-calculating the surfaces, and letting loose an automated die sinker, or by taking a worn A2 die, welding in the areas you don't want there to be the extra metal, re-machining it and doing some test forgings. The first costs time on a computer and CAD/CAM system/automated die sinker; the other takes times, skill, effort and test materials. It is just a matter of where you want to invest the money and effort.

A halfway-Retro rifle that you can get right now is the Century Arms C15A1. Century built it up from a parts kit out of an M16A1, with the "naughty bits" neutered to keep you out of trouble. It has a skinny barrel (US-made now, in lieu of the import restrictions) with a 1:9 twist, and the lower is a current, A2 configuration lower. However, if you want the look of the old Colt SP1 or the M16A1 and you don't want the hassle of building one up from parts, that is the way to



go. Functionally it will serve you well as a Vietnam Era AR, even if a few of the cosmetic details are not period-correct. You'll also get it now, and not after all the time it takes to acquire the parts and build one. Plus, if there's something wrong you have Century to go back to, instead of a small shop or your own skills.

And, for most who want a "Vietnam" AR-15/M16, that is a very attractive option.

But some of you are going to want a bit more attention to verisimilitude. That means tracking down



a slickside lower, or upper and lower. Me, I opted to build an early XM-177/177A1 and for that I needed a genuine old receiver set. Alas, in researching it, I found that the early semi-auto Colts were either the two-screw abominations (not at all Retro, even though they are period-correct) or that they had already been snapped up by collectors. Buying an over-priced Colt collectible just to rebuild it as an XM-177 wasn't in the cards.

So instead I started fresh. NoDak Spud makes uppers and lowers of the correct period. You can have them in



The Century International



Triangular handguards, not always easy to find these days.



The earliest models of the AR lacked both a forward assist and an ejector lump.

pretty much any configuration you want, so I perused the list. I already had an upper, a Colt of the earliest vintage, so old it was machined for the non-captured takedown pins. I wasn't really keen on a front pin that came out, so I opted for a partial-fence NoDak lower, one that has the fence for the takedown retainer, but not around the magazine button.

In order to do this, and do it properly, they had to invest in new forging dies. Once the forgings were done properly, it was relatively easy to machine the lowers and uppers into the desired configurations. As Nodak is set up to do the machining, once they had the forgings, making a period-correct lower is a piece of cake. I settled on the lower they denote as the NDS-XM16E1.

Once arrived and checked for fit, it and the upper and a hatful of other parts went off to US Anodizing for a re-do, to make them the correct gray color that was the color of the early guns.

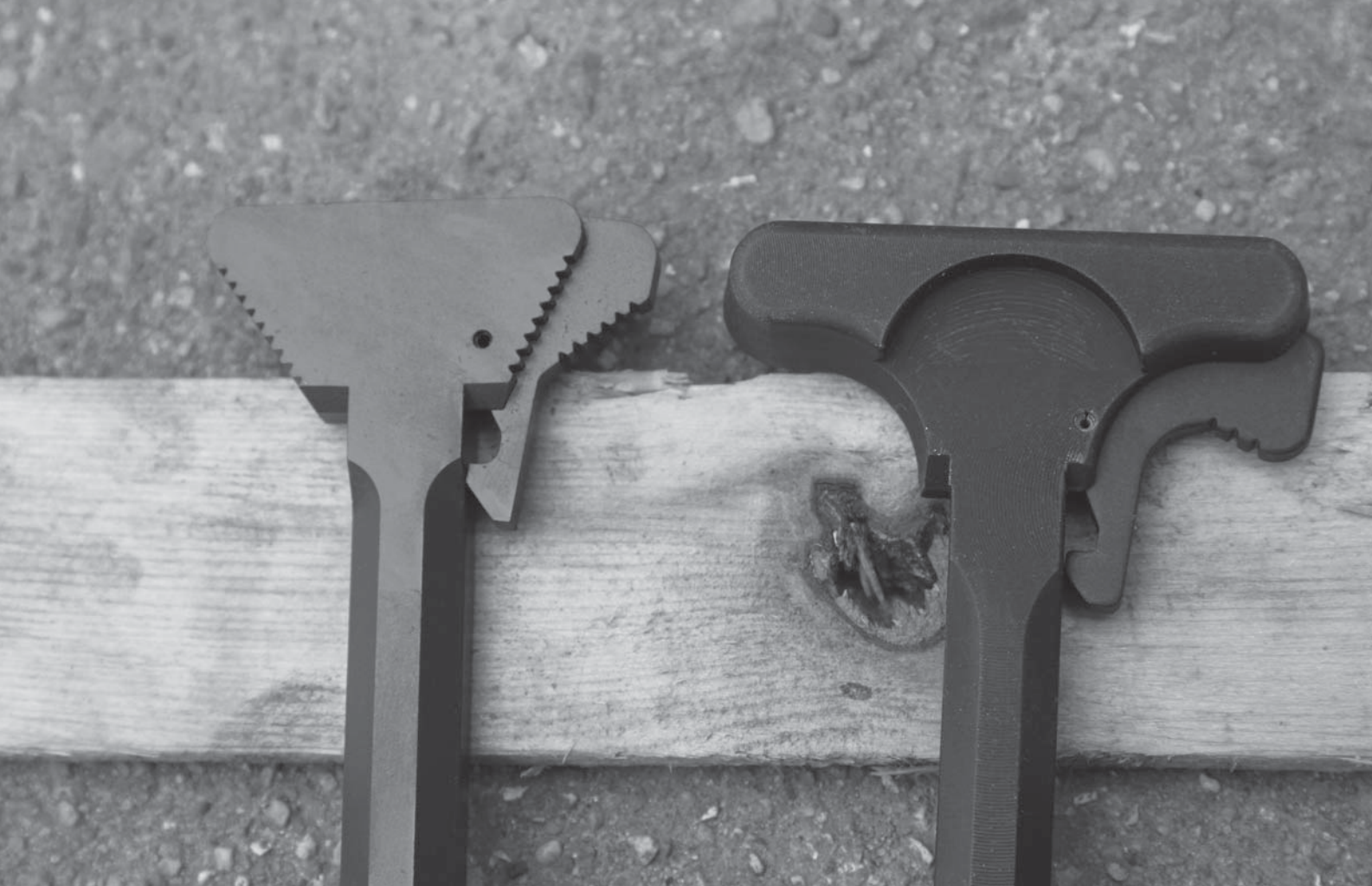
While that was going on, I had a barrel I sent off to Pat Medders. He would take my 16-inch CAR lightweight barrel, trim it, install a faux XM-177 suppressor on it, and then blind-pin the extension on so it was correct length again. Now, this is a delicate operation, and one you cannot have done to just any barrel. To look right and work right, it has to be a skinny barrel. You can't take an M4-type barrel and do it and have it come out right. That pretty much means you have to go with a Colt lightweight carbine barrel (ferociously expensive) or a Bushmaster lightweight carbine barrel (sometimes not in supply). After a couple of false starts with barrels I already had on hand (sorry about that, Pat), we just went ahead and did a Bushmaster. Why all that? Why not an exact XM-177 configuration? First of all, the "177" is considered a short-barreled rifle under the National Firearms act of 1934. (It is also considered a machine gun.) Second, the



The faux suppressor, now just a flash hider.



The faux suppressor has to be permanently attached, to remain long enough to be lawful.



The original charging handles were triangular, not T-shaped.

flash hider/moderator was determined to be a suppressor by the ATF some decades ago. Being a suppressor put a real crimp in the sales plans of Colt back then, as suppressors are a separate export item, strictly controlled and enforced. Curiously, there were customers to whom Colt could sell a short-barreled machine gun, to whom they could not sell a suppressor.

Today, those who live in places where short barrels, suppressors or both are prohibited by state law, need an option. Plus, even if you live someplace that allows them, you have to be careful traveling. So, to avoid all that, and show you how it all comes out, I had Pat do a 16-inch final length, with a flash hider that is just a flash hider and not a (minimal) suppressor. Now, being a modern, chrome-lined barrel, the Colt or the Bushmaster is not going to have a 1:12 twist. Big deal. I can live with that variance from authenticity, and it does, after all, make the rifle entirely useful with modern, heavy-bullet ammo.

The details matter on a Retro build, and on the XM-177, an early gun, the small parts on the rifle were slightly different from those on the later guns. If you want the small parts to be correct, you have to either track them down or get new ones made on the old pattern. Take the the charging handle. The originals weren't a "T" shape; the grabbing end was a triangle. The other parts were also slightly different, and there you need to cruise all over the Nodak web page and find Jerrell Sharp. He makes the new parts like the old parts, and you can have a detailed and period-correct rifle.

Now, Nodak, Pat and Jerry don't offer all the parts. You'll need the internals: bolt and carrier, etc. The earliest guns had chromed bolts and carriers. They can be tough to find, but I got mine at DPMS. Yes, you can get chromed ones elsewhere, but DPMS was the only place I found that had a "slick" carrier – that is, with no notches for the forward assist. I mean, if you don't have a forward assist, why have the notches? Granted, no one



While the complete package is a little bit longer than the originals, it is close enough, and remains kosher for use in states that don't allow SBRs.

can see, as long as the carrier stays in the rifle, but to quote the sculptor who was carving details on the backs of the gargoyles on the church, details no one on the ground could see: "I'll know."

Last up is the stock. The originals were tele-stocks with two options: open and closed. There were no intermediate stops. So, if you use a standard current buffer tube, it will have extra stops. If you want something to shoot and you need the extra positions, go for it. If you want authenticity, then you'll have to acquire a two-stop tube. I had one on hand and used it. If you do not, then you can get one from Essential Arms in Krotz Springs, Louisiana. At one time they offered slickside lowers but no longer do. And the slider itself has to be the old CAR slider, with the rectangular sling swivel loop on top. The originals were vinyl-coated aluminum. However, they were soon switched to plastic. So, if you absolutely have to have the early ones, track down an aluminum slider. If it isn't vinyl-coated, a few coats of gloss black paint will probably do. Otherwise, like the rest of us, you'll simply go with a common plastic slider.



The first stocks gave you two choices: open or closed.

The handguards are easy, as the round carbine handguards were not changed. Now, if I'd wanted to have the short triangular handguards, that would have taken some hard searching and even perhaps a session with various adhesives and holding fixtures. But I'm happy with the round ones.

The end result is a carbine that is about as light as you can make one that still functions as a real firearm. The faux suppressor adds a few ounces to the final build,



Here it is, in all of its 5.6 pound glory. That's right, a 5.56 carbine that weighs less than six pounds, empty.



Light, fast, handy. Now all I have to do is resist the temptation to "improve" it by adding things.

but that can't be helped. And, even as a faux "can," it probably isn't much heavier than the originals.

Now, you could do all this again, but instead of the XM-177 result, use a 20-inch pencil barrel and an A1 stock to produce a faux M16 or M16A1.

The result, in either case, is a lightweight carbine the likes of which you cannot get over the counter today. A current M4gery runs on the order of seven and a half pounds. An M16 clone, or M16A1 clone, done right,



Scholars of the early AR-15/M16 will no doubt point out the two details that are incorrect on my XM project, and which will be corrected just as soon as I find the right parts.

weighs a pound less than that. A well-done XM-177 clone should be close to or just under six pounds. And in that featherweight carbine you'll have a modern barrel and internals that deliver the reliability and accuracy that a current-production gun delivers, but with the looks and weight of the original. And in this modern age of M4geries and Mk12 Navy clones, a Vietnam-era looking AR has instant eye-appeal. Pull one of these out of your gun case at the club, and you'll get asked about it.



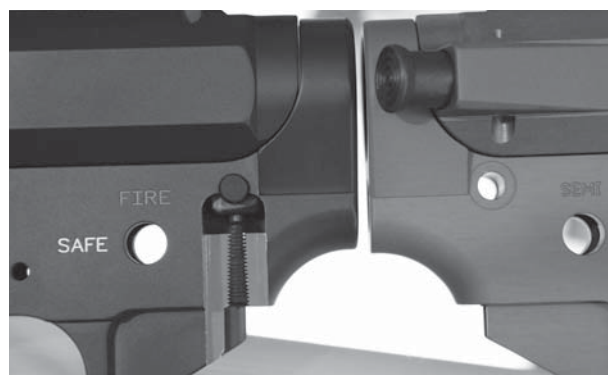
The basis of my high-tech build: Sun Devil receivers, PMag sights, PWS buffer tube, and PRI carbon fiber handguard.

The High-Tech Build

OK, the mil-spec is to use 7075-T6 forgings, and machine the insides to accommodate magazine and internal parts. However, as I've pointed out before, mil-spec in this regard means late 1950s technology. There is a better way to make uppers and lower. If you start with a billet of already heat-treated aluminum (and you can even exceed the specs of 7075-T6 if you wish) you can take advantage of modern machining and craft a receiver out of that block of aluminum.

Now, billet-machined lowers are not new. I first saw one back in the mid 1980s marked “Palmetto Armory” and it was, well, fugly. The maker, so the AR-15 lore goes, was Olympic. This one was a very early gun, and they hadn’t gotten to the point of polishing off the toolmarks. You could see each pass of the cutting tool in the surface of the lower. Later guns from Palmetto had the toolmarks cleaned up.

Why make it that way then? Because only Colt was making lowers and making them into rifles. If you wanted an AR, you bought one the way Colt made it. So,



The Sun Devil lower has a tensioning screw inside, to make sure your chosen upper is a snug fit.

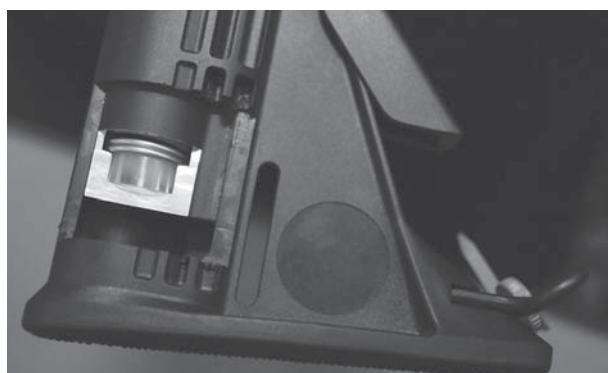
other makers tried to find ways around the bottleneck of Colt. Why'd they stop back then? Because makers found a way to get forgings and finish the internal machining themselves, not needing Colt any more. Why re-start making them that way? A combination of things: there are only so many places in the US that can forge the uppers and lowers. In many instances the forging dies are owned by the customer who buys the forgings.



Sun Devil machines their receivers from pre-heat-treated billets of aluminum.



Sun Devil makes very elegantly sculpted billet-cut uppers and lowers. Here is an upper in black.



The PWS buffer tube has a built-in cushion on the end, to dampen felt recoil.

So, if the XYZ Corp invests in forging dies, for their own product line, you aren't going to entice the forge company into "running a few extras" off the XYZ dies.

Finally, the prevalence of CNC machining stations, and the programmers to run them, makes CNC machining very attractive. Every time an auto plant closes, there are a slew of CNC machining stations suddenly on the market. (Such machines are commonly

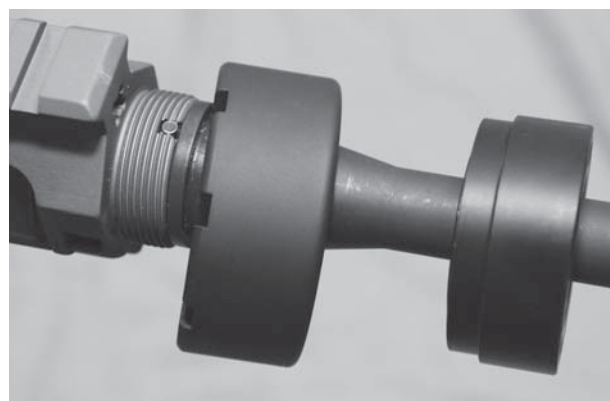
leased, not bought.) A re-furbered machine that the Big Three have no use for can be leased at a very attractive rate. As a final icing on the cake, if you are a new AR maker, machining forgings, you are at the bottom of the list. If suddenly Colt needs a metric buttload of forgings to fulfill a new government order, you get bumped for their order, which may take a month of hammering red-hot metal. Machining from billet, you simply are



PWS makes SBRs, for those of you who live where they are kosher.



The new PRI design is a triangular handguard, more ergonomic.



The PRI handguard has the barrel nut go on from the front, and the tube nut on from the back, then the whole thing into the receiver.

another billet customer and you get your product shipped in the order you and the rest of the customers checks clear the bank.

Which is what led me to Sun Devil and finding out the advantages of billet products. A forging aligns the metal of the part being forged – which can be good but can also induce stresses. As the parts are machined, the stresses are relieved at different rates. In many instances, this doesn't matter. However, if you can get better, why

not? So, machining from solid billets of pre heat-treated aluminum, David Beatty adds to the good parts of the AR upper and lower. First, the lower incorporates an upper tensioner. Hidden by the pistol grip, the nylon-tipped tension screw rises to push very slightly on the lower face of the rear lug of the upper receiver. That allows you to fine-tune the fit so the takedown pins will slide smoothly, but the upper and lower will not have wobble. (Of course, if you have a Sun Devil upper and lower set, this is just



Once everything is lined up, you use a strap wrench to tighten the handguard nut.

icing on the cake, as they won't have any wobble.)

The magazine well is larger, for a faster reload, if you're using it for 3-gun matches. Or even if you aren't. The reinforcing fences, on both sides, are larger, but they don't protrude more, so you get a stronger, stiffer receiver without a great big ridge running along the side of the lower. The buffer tube loop is even more reinforced than that of the A2, so you don't have to worry about breaking the loop if you bang your rifle on something. And, you can have custom engraving if you want. After all, the computer is already cutting on the billet. Once it has established the flat where you want your engraving, it is a simple matter to switch cutting tools and sink in your design.

The upper has thicker side walls for greater rigidity, a full-length Picatinny rail on top, and forward assist and ejector lump.

All this, and you're still not done. You have your choice of finishes. You can have a satin black hard anodized, a hard color anodized, black molycoat, or the Devilcoat, which is a nickel/Teflon coating. For this

build I opted for the Devilcoat, even knowing ahead of time that I'd have a devil of a time keeping paint on it. [Insert laughter here.]

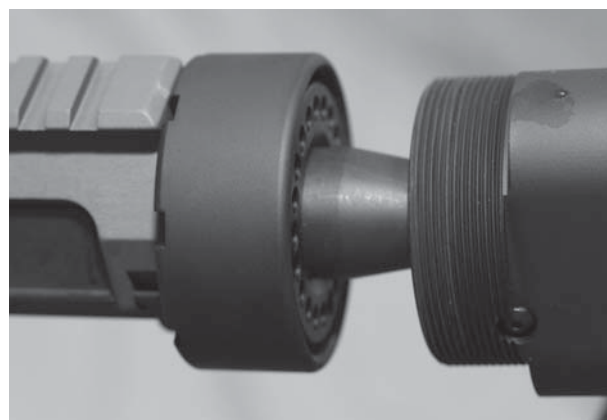
However, if you want hi-tech builds, Sun Devil isn't your only choice.

Vltor is a maker of stocks. However, Vltor is also a division of a big aerospace manufacturer, and the level of precision "needed" for stocks is almost laughable to a real rocket scientist. Even the level of precision to make barrels is a minor consideration. Making precision uppers is a piece of cake for them. They make VIS and the MUR. The VIS is an integral-handguard upper, with the lower half of the handguard removable for the installation of an M203. However, to make life easier (and the product more precise) they go about it the hard way: the upper and rail are partially-machined, then welded together, stress-relieved, finish machined and anodized. The result is an integral-rail upper that allows for lower accessories as well.

The Vltor MUR is a lower with options: you can swap in or out, or just order and build it as a forward assist



The PWS buffer tube has a front lip, to combat carrier tilt if you install a piston system.



Once the barrel nut is tight, then you screw the tube nut to the handguard.

only, deflector lump only, both or neither upper. The MUR upper is forged, then stress relieved, heat-treated, aged twice (yes, heat-treated parts can require aging) and cryogenically treated to relaxed all possible stresses that may remain after such a rigorous process. Then it is CNC-machined, hand inspected and sent on for anodizing.

Vltor does not make rifles; they just make uppers and stocks. So, if you want to have a rifle based on one of these you'll have to track down the rest of the parts and build or have built a rifle using Vltor uppers.

I have all, but for this project I went with the Sun Devil upper and lower. Next up: handguards. Rather than go with the normal railed aluminum handguard, I went instead with the high-tech approach-carbon fiber. When I first saw a carbon fiber handguard, they are simple tubes with a barrel nut at one end. I was at a USPSA Nationals in the early 1990s (I don't remember which one, but it was at PASA Park) and a vendor had a carbon fiber handguard on the table. It was light, it was handy, but was it durable? In answer to my question, the vendor picked it up off the table, swung around and slammed it against the aluminum tent pole. We were in a very large tent, and the pole was a tube some six inches in diameter. As he swung into it, I noticed the scuffs on the pole's surface, and out of the corner of my eye I saw the nearby vendors flinch. This clearly wasn't going to go on much longer, but while it lasted the pole was getting the worst of it.

So yes, they are tough. PRI makes carbon fiber handguards, and they make them with short lengths of rail bolted on. I imagine that if you were to treat one of the PRI handguards similarly, the rails would be peened



The PWS buffer tube has a lock nut, clamping the plate to the receiver.

and eventually break off, but the tube would remain. The biggest advantage of the PRI handguard, however, is that the tube and the barrel nut are separate, so you don't have the royal hassles of "clocking" the plain old tubes we used to build with.

Now, a rifle needs a barrel. And bolt, carrier, etc. For bolt and carrier I simply depended on the standard items from Stag Arms. For a barrel, I had a lightweight carbine barrel, 1:9 twist, from M&A Parts on hand. To install the PRI handguard I had to remove the old sight tower and the barrel nut and slide on the PRI barrel nut in place. Since the barrel was now missing sights, I put a low-profile Doublestar gas block on the barrel.

That leaves us with the back end. For a buffer tube, I went with the new tube from PWS, their Enhanced



**Secondary locking screws on top
balance out the locking forces.**



**Things are shaping up nicely. Now,
which drop-in trigger system?**

Buffer Tube. First off, it eliminates the castle nut. Instead, the clamp plate (spring retainer) is held on by a shoulder integrally machined into the one-piece buffer tube. The shoulder has screws above and below. The bottom screw indexes on the retaining plate, and presses it into the lower receiver recess. The two upper screws clamp on the receiver ring and keep it in place. The tube can't unscrew because the bottom screw is set into the retaining plate recess, and the top screws are friction-fit against the receiver.

The tube shoulder also has QD sling inserts machined into it on each side, so if you want a centerpoint sling, you don't have to add gear, you simply use the provided ones. The tube is fluted to allow debris to pump out, and there is a drain hole in the bottom rear

so water can drain out when the rifle is horizontal.

The bottom lip of the tube is extended forward, covering the buffer retainer (there's a slot for access) and this also acts to pick up the tail end of a carrier if you have a piston system on the lower, combating the effects of carrier tilt. Finally, PWS installs a dead blow buffer in the back of the tube, to soak up an overtraveling buffer weight and lessen felt recoil.

And you thought there was no room for refinement or improvement on something so simple as a buffer tube? Pessimist.

The final touches, outside and in: a Magpul CTR stock in foliage green and a standard carbine buffer spring with an "H" buffer to keep the carrier and bolt well-controlled.



The LaRue complete upper, ready to go. Well, I had to add sights and optics, but that's no big deal these days.



LaRue makes free-float handguards, among the best.



Among the details that LaRue attends to are niceties such as this anti-rotation lock on the handguard.

Complete Uppers

Now, if you want to have all the benefits of a high-tech complete upper but you don't want to build one, you can go several routes. Lots of people make uppers ready to go, but there are a few that stand out. First up is LaRue. You can go with a Tactical Stealth Sniper System, the product code LT011. Here you get a LaRue billet upper, and a LaRue railed free-float handguard, your choices of barrels and handguard lengths. Of course, if you opt for something shorter than 16 inches you'll have to provide

some proof of having a lawfully tax-stamped SBR.

The LaRue barrels are LW-50 stainless, medium contour, 1:8 twist polygonal rifled, and given a Wylde chamber. The Wylde chamber is a combination of the .223 and the 5.56, combining the best attributes of both for reliable function and accuracy. If you want, LaRue can leave off the IONbond finish treatment, which otherwise gives the barrel a semi-gloss black coating (back when I got mine they were stainless). The



In case you had any doubts about who made the barrel, LaRue marks it.



Your LaRue upper comes complete with mil-spec or better bolt and carrier.

IONbond is super tough, and it Rockwells at 90 or so. It won't chip, peel or corrode and is still working at 1200 degrees. Leave it off, and your barrel is plain stainless. LW50 is a non-sulphur-containing alloy, and testing has shown that non-sulphur stainless alloys resist heat better than the sulphur-containing ones. Free-floated in the LaRue handguard, it can do its best, which is very good indeed.

The LaRue TSSS comes with a bolt and carrier, so all you have to do is push your pins out, take off the old upper, put on the new, push the pins back and get to work. The bolt and carrier are mil-spec M16 parts but are assembled to closer tolerances and with greater care than "mere" mil-spec standards. Each one is inspected, then test-fired for ten rounds before being packaged and shipped to you.



GG&G makes an upper, the Dominator 1, that is quite the bargain.

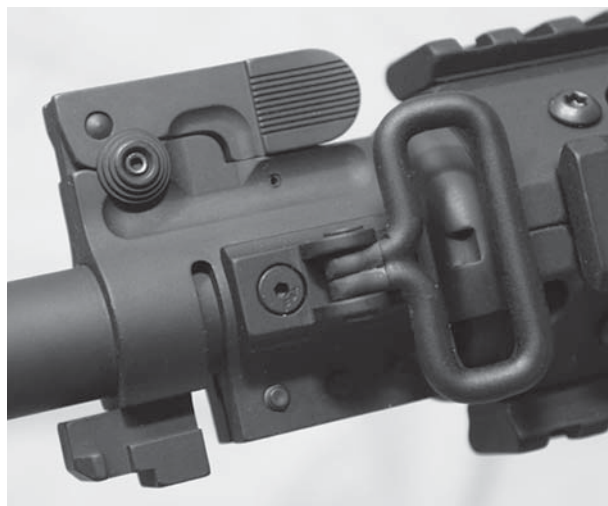


No doubt as to who makes this upper.

Now, if you are following one of the new rages and insist on a mid-length gas system, then LaRue has that too. It is the DMR-16 upper, and it has all the technical features of the TSSS, but you only get one choice: 16-inch barrel, middle gas system, and LaRue 9.0 handguard setup. (As if you need more.) The DMR-16 comes with a fixed front sight. The TSSS comes without sights. So you'll have to put at least a BUIS on the DMR-16 and a front and rear on the TSSS. You'd be smart to order a LaRue scope mount while you were at it, either one for optics or one to quick-attach a red-dot sight on.

Now, other people make uppers besides LaRue. Lots of them. Not all are more than just a collection of parts.

One that is comes from GG&G. Makers of many accessories for the AR, GG&G also offers a ready-to-go upper, their Dominator 1. You have choices with GG&G. You can, first up, pick barrel twists. If you want a 1:7, you can have it. If not, you can select the good old compromise: 1:9. The Dominator 1 comes with the GG&G folding front sight and GG&G rear sight. You can have a railed handguard or a railed free-float handguard. The barrel (your choice; 16 or 14.5 inches, NFA rules apply) comes with a flash hider and is contour-cut for an M203 grenade launcher. What it lacks is a bolt and carrier, but if you're replacing a worn-out upper and barrel, you can use the bolt and carrier you have or acquire a bolt and carrier from just about anywhere, as they are now as common as displays for the lottery at gas stations.



The front sight gas block includes a folding front sight tower and a built-in sling swivel.

How desirable are complete uppers built to the top-end specs? Simple: good enough to bet your life on. When it comes to being shipped to Iraq and (especially now) Afghanistan, if your senior NCO and the CO are willing to approve it, you can bring your own upper over. Not a complete rifle, as military regs do not allow personal weapons. (In the old days, pretty much everyone who wanted to get the job done was willing to turn a blind eye to any official statement that personal weapons were *verboten*. I guess today we're much more in the situation of having our official safety being managed by lawyers and business school grads instead of warriors. So much the worse for us.)



**Once up, the GG&G sight locks in place.
It won't get bumped down.**

**GG&G offers you a top-notch
barrel on the Dominator 1.**



So, with the approval of superiors, you can bring an upper in. However, once there, you can't bring it back. No souvenirs. (I was slack-jawed at the news that GIs and Marines could not bring back so much as a bayonet as a souvenir or risk charges.) You can leave it there, and pass it on to someone in the unit that replaces yours (if their CO is willing to give approval) but not bring it home. Despite that, many soldiers and Marines are willing to shell out \$1200 of their own money to make sure they have the tool they need to whack insurgents and Taliban on arrival.

As much as I have to stand in awe of their enthusiasm, I shake my head at the situation of troops who, were it not for the combat pay they receive, would be in the position of qualifying for food stamps, shelling out their hard-earned money for the tools the bosses won't give them.

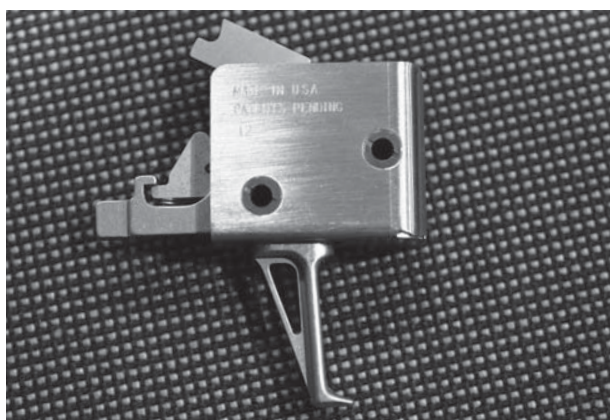
The next time you see a soldier, sailor, airman, Marine or Coastie, thank them. Odds are, unless they are absolutely fresh out of boot camp, they've been in combat.



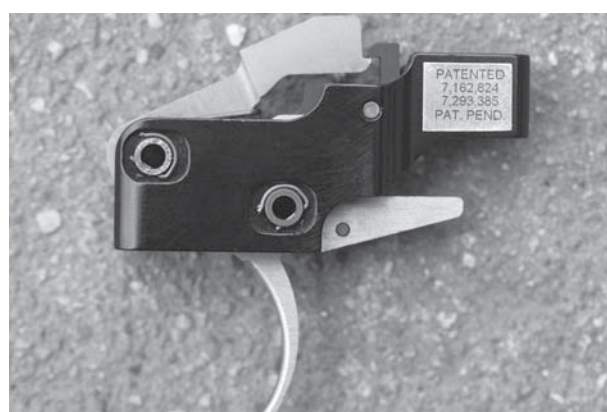
Timney makes a drop-in trigger unit, and they have been making replacement triggers for a long time.



The Wilson combat drop-in two-stage trigger unit.



The one that started this trend: the Chip McCormick drop-in trigger.



The American Gold, the trigger Jerry Miculek used to win the USPSA 3-gun Nationals with.

Triggers

The mil-spec trigger system is durable, rugged, reliable and difficult to break. What it isn't, is a match trigger such as target shooters are accustomed to. If you're a 3-gun shooter and you're using a handgun with a tuned trigger such as many 1911 competition guns have, switching back and forth between your 3.5 pound 1911 trigger, clean and crisp, and your 6.5 pound AR trigger, long and crunchy, will hurt your scores. If you're a police sniper (oh, excuse me; precision marksman) you won't want to give up your .308 bolt action for any self-loading rifle that has, in your parlance, "a sucky trigger." Nor should you, with the job you have.

To that end, gunsmiths and inventors have been improving the AR trigger for decades. The first big step was from JP Enterprizes, where they designed a set of parts that looked like, and worked like, the AR's, but the trigger had a set of adjustment screws on them. Once properly timed and adjusted (and very important: locked down) the JP trigger limits sear engagement, overtravel and weight of pull. When properly set up, it works wonderfully. But that's the catch: once it is set up. It is not a drop-in part, and if you don't know what you're doing you can find yourself among a bad set of choices: a trigger no better than you had, a trigger too



Geisselle makes both one- and two-stage triggers. Read the instructions, and you'll be happy. Don't, and you won't be happy.

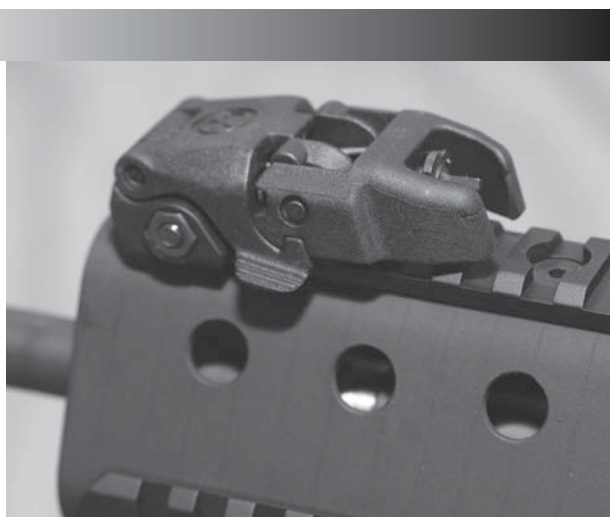
light to be safe, or one that won't fire or fires too many times, or parts mangled so badly that you have to go back to the originals.

If you want the JP trigger and the great trigger pull it delivers, have someone who does it for a living do it.

The next step came to us from Chip McCormick. He simply made the trigger assembly as a self-contained unit, one that you installed by removing the other parts, plugging the self-contained unit in and reinstalling your safety. The trigger can be a single stage or a double stage, with straight or curved trigger face. You pick one combo, as there is no user-serviceable aspect to it. Now, as good as the McCormick unit is, it has one drawback: you have to use pivot pins with external "C" clips. The design does not lock on to the grooves in the standard hammer and trigger pins. Now, if external "C" clips are an aesthetic affront, move on. Otherwise, you've got a really good trigger pull ready to go in less than a minute's work.

There are no screws, as any gunsmith will tell you things should not be attached to a firearm with screws. That we have to does not mean it is a good idea; only the sole means for that method. (Try attaching a scope to a rifle some time, without screws. It isn't easy.) There is no adjustability on this system. Nor should there be. You're getting a clean, crisp trigger pull without any work on your part. Why risk screwing it up by adjusting something that doesn't need adjusting?

Next is the American Trigger Corp., made as a self-contained unit, with a clean, crisp trigger pull. The designers intended it to be an improvement and sent the first few R&D samples off to a dry, dusty location where the field testers could count on lots of trigger time. They had sent the triggers off as improved AR triggers, but not full-blown competition triggers. What they heard back, from guys who found in their environment that water as far more valuable to drink than wash with, was that they "needed to make it feel more like a 1911." In other words: clean, crisp and with a short reset.



The Pmag folding front sight, on the PRI top rail.



Geissle makes triggers for military use, including (not this one) one that is both a match trigger and a select-fire trigger.

So they re-tuned it and sent more. Those the guys loved. Next, they showed it to Jerry Miculek. Anyone who knows anything about guns knows Jerry is the predominant revolver shooter of our generation. What a lot of you don't know is that he is just about as good with everything else. So, American Trigger sent a test unit to Jerry for his feedback. He responded by putting it in one of his rifles, testing it, leaving it in there, and heading off to the USPSA 2009 3-Gun Nationals. Which he won. Now, top-flight competition shooters do not change their gear on a moment's notice unless there is some clear advantage. And even then, they like to test, tune, adjust and verify. Jerry put the trigger in, shot it, packed his bags and went to the match.

The AR-Gold, as American Trigger calls it, offers several advantages: for one, the trigger re-set is so short and quick it is much the same as a 1911 re-set. So, transitioning from your 1911 to your AR is very easy. Second, it has internal clips so it locks onto the existing trigger and hammer pins. No external "C" clips needed. Finally, when you push the selector to Safe, the hammer and sear are cammed apart. So when the safety is on, the hammer and sear are not even touching, nor can they.

The latest entry into this field is the Wilson Combat Tactical Trigger Unit. Bill Wilson, ever the guy keeping an eye on things in the firearms market, has produced not one, but two models of the TTU: a single stage and a double stage trigger. They are both made of steel, with

the hammer and trigger pivoting on the steel sleeves the hammer and trigger pins pass through. They both have internal clips to hold those same pins, and they both have a 1911-style half-drop notch so even though they are super-clean match triggers, they withstand military drop tests.

So, why single and double stage triggers? Trigger feel. A single stage trigger has no slack. That is, when you press the trigger, from the get-go you're beginning to pull it out of the hammer notch. So you jump on the trigger, it builds in pressure, and then all of a sudden it releases to fire. On the double stage trigger, there is a significant slack to pick up. You press on the trigger, and you feel a very light resistance, and then the trigger stops. You apply some more pressure, and then the trigger breaks, the hammer falls, and the rifle fires. If you're used to a single stage trigger, using a double can be an interesting experience. If you're used to a double, trying to shoot a single-stage can be frustrating at first. It is all a matter of what you're used to, or like.

Now, all of these triggers have a few things in common: they will not work with the Colt ARs that have the sear block in them. That is the steel gizmo that Colt stuck into their rifles to preclude conversion to full-auto. They do not have adjustments, and you simply plug them in – except for the Chip McCormick, they are made for the small-pin lowers. So, if you have a large-pin Colt, your only choice is Chip. And none of them work with



The PMag folding rear, on the receiver.

select-fire rifles. If you're lucky enough to have a select-fire AR (aka M16), and you want a match trigger, you have to move on. But we have something for you, too.

Geissele Automatics makes match triggers. What's more, they make match triggers that can work in a select-fire rifle. Why? Despite the common prejudice, even machine guns can be accurate. And those who shoot them are not always looking to simply hose \$50 worth of ammo out every minute. The Geissele are two-stage triggers that are drop-in units appearing much like the original trigger and hammer. They are not a self-contained unit. There is a safety sear, so if the rifle gets dropped (hey, we're all careful, but in combat, things happen) the safety sear will intercept the hammer before it can complete its journey.

And, as a two-stage trigger, it is a perfect example of the description above. The initial take-up, the slack, requires about two pounds of force. Then, pushing the sear away from the hammer requires another two and a half pounds. Total, 4.55 pounds, but all the way it feels more like two pounds. Target shooters love it because once you have the slack taken up, you're two and a half pounds from breaking a perfect shot. And, if you let

go, the two pounds of slack are released, and you have to start over again. You can feel your way to the break point, without going over.

What do we have, at the end of all this? Well, for one thing you have a rifle that can produce eye-popping groups. Even a pencil-barrel like my Sun Devil carbine will produce MOA or sub-MOA groups with a variety of loads since it is free-floated. If you go whole-hog, and get something like (or indeed, the very thing) a LaRue upper and your lower has a match trigger in it, you have a rifle that promises half-MOA groups. If you are a precision marksman, or just a really good shooter, having the potential of .5-inch groups at 100 yards at your disposal is a very comforting thing indeed. And for the military, having the potential of three-inch groups at 600 yards while trying to discourage Taliban "marksmen" on a ridgeline overlooking your position can be just the thing you need for a long career, retirement and playing with your grandkids some day.

After all, there is no such thing as "too much accuracy," especially if you do not have to give up reliability to get it.

So, in the words of my friend Dave Fortier: "Get some."

COLT IN THE NEW ERA

CHAPTER 17



The Colt folding, telescoping, "compact" stock that sets new standards on ugly.



**Once folded, it sure is shorter.
However, it makes the rifle twice as
thick, which is hardly an improvement.**

A lot of people give Colt grief, and I've been a vocal member of that group. But, in all fairness, I have to give Colt a lot of credit. You see, the problems they have are not all of their own doing. (Many are, but right now, we're praising Caesar, not burying him.) It is fashionable to, on the one hand, extol Colt as the be-all and end-all of mil-spec rifles – and then, with the other hand, to tear Colt a new one for not making something better. If you do, it's because you do not understand mil-spec. Mil-spec means you build it exactly the way the procedure says, complete with the testing, inspection and standards

laid down. If it is better, fine, but it had better meet the specs laid down by the relevant military specifications, whatever they are.

Something better that doesn't meet the spec is rejected plain and simple, not considered for purchase, adoption, or replacement of the old standard.

As an example, the 4150 steel, hard-chrome lined barrel and chamber that goes into each M16A2-3-4 or M4? That was the best that could be done circa 1959, with some modest upgrades added in 1985. Are there better barrels now? You bet. Let's take, for example, a



Here you see the stock, unfolded partway.

combination of existing better barrels and make a super-barrel: let's find a stainless steel that meets the specs of the LaRue steel, LW50, and which can be hammer-forged. Let us then give it the latest in hi-zoot rifling design, then cold hammer-forge that puppy into a barrel, complete with chamber. Use the CNC automated lathe to thread it on both ends, and torque on a barrel extension. Cryogenically stress-relieve it. Drill the gas port, and treat the barrel with Melonite, Ionbond or some other super-nitriding finish that produced a near diamond-hard barrel without the unevenness of chrome plating.

Would that not be the barrel of all barrels? Yep. Do you think Colt hasn't thought of it, and offered it to the Army? Sure they have. And the reaction of the Army? No thanks, send us more of those 1959-era barrels.

Ditto the uppers and lowers. Could Colt make a superior upper and lower, out of a better alloy, with improved heat-treatment and surface finish? Of course. Have they also offered this to the Army? Sure thing. And the Army's reaction? More of the same: "Send us the reliable old ones."

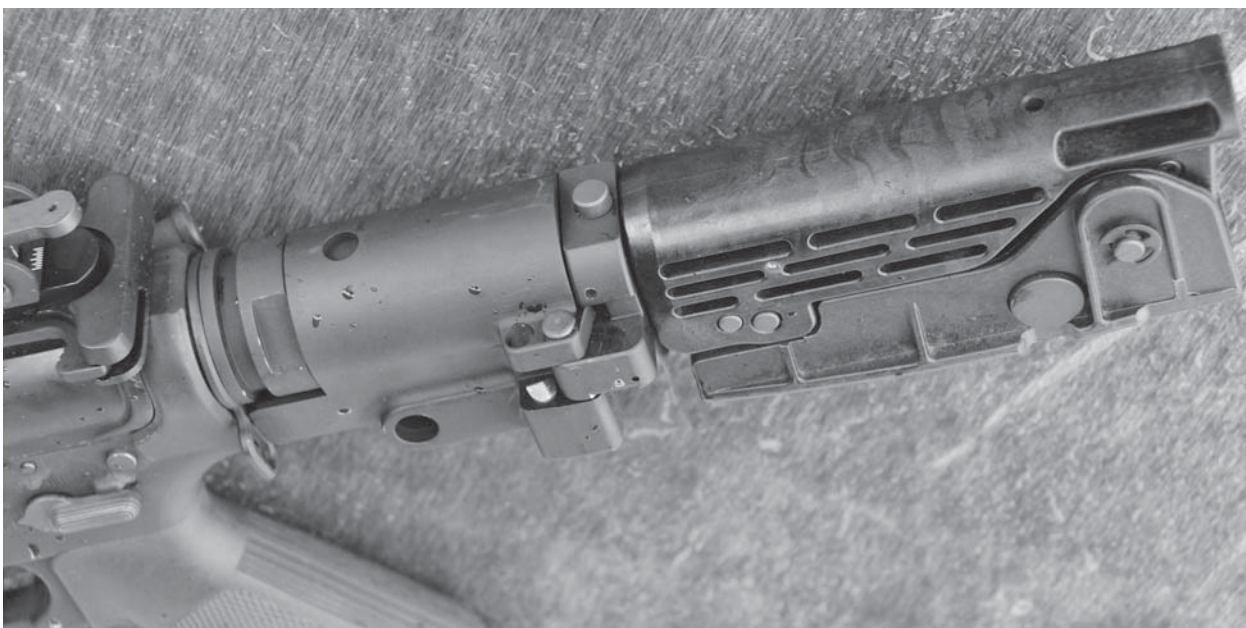
Why? The system isn't built for it. Ever since the Army adopted the M16, they've been trying to replace it. Why improve something that will be replaced "soon?" Also, why spend a piddling amount of money to improve it, when the Army is already spending a ton to replace it? You see, Colonels get their chance for Senate confirmation when they work industriously in projects that greatly improve the Army's warfighting capacity. Generals get another star when they sit in front of gullible Congressional committees and earnestly assert that the new "phased plasma rifle in the 40-watt range" that their program is working on, and which "only" needs a few hundred million more and another set of tests, will make all other small arms obsolete, and greatly enhance the security stature of the United States.

An example is the execrable OICW, which recently died a well-deserved death, but stands ready, like a vampire, to jump up and suck even more R&D funds out of the system. The idea was a combined grenade launcher/rifle that fired "smart" grenades. These grenades would be programmed, by the soldier, in real time, to explode just past the wall the bad guys were hiding behind.

The whole thing was a mess; it was bigger than, and heavier than, the GPMG, either an M60 or the M240. Soldiers had to program the shell before each shot. The whole thing was a mass of electronics and cost thousands of dollars. The grenades cost some \$25 each. Proponents asserted that volume production would bring the costs down, but decades of experience with the same assertions by the Air Force on such matters indicate if anything, it would cost more. So, we'd have soldiers hauling mondo-expensive launchers around and firing shells of \$25 or more. Let's assume the XM-29 (as it was last called) "only" cost \$4000. A basic load of shells, at \$25 each, comes to \$500. For that same \$4500, the Army could buy an M4, a spare barrel, and enough practice ammo to wear out the first one as the soldier hones his or her marksmanship skills.



The culprit of making it so thick: the hinge is on the outside of the buffer tube, not in its middle.



While you can shoot it like this (or at any step of the folding/unfolding) it sure wouldn't be comfortable.

Now, let's assume you're the project manager of the XM-29. Will you allow a single penny to be spent on an improved M16? What, are you crazy? No, no money to something your program will "soon replace," thank you very much.

Meanwhile, the guys in the sandbox, reading the current gun magazines filled with articles about superior

metallurgy, coatings, surface treatments, ammunition and optics, keep complaining that what they have is out of date.

If, as with any other profession, industry or field of study, the Army had allowed the M16 to undergo incremental improvement, we would not be talking about piston systems, new calibers, or steaming piles of dung



The little button on the side is what lets you flip the buttplate down.



The buttplate has just two settings: open or closed.



Opened, it actually looks like it might be useful.

like the XM-29. But that isn't the case. So let's talk about what Colt does have, and what they've been doing.

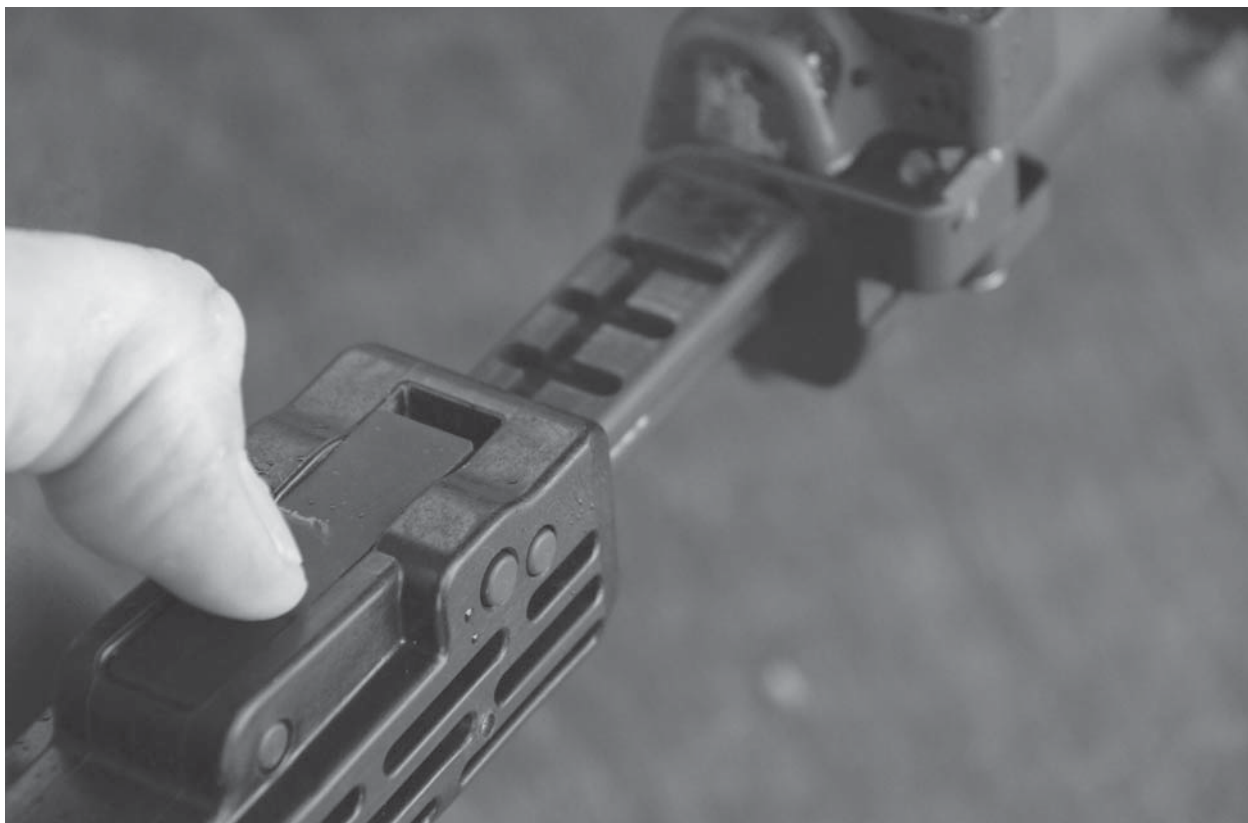
First up, and I have to tell you that even as I prepare to send this off to the editor and the presses, that none of this is on the Colt web page (no surprise there) as the LE6940. Colt has always had an arcane designation system for their rifles, and making head or tails of it requires a degree in both Philosophy and Existentialism. The upper is a monolithic rail system, but one with a twist, as we'll see.

Starting with a single forging, they machine away all the stuff needed to make a free-float, monolithic rail upper, and then install the usual parts in it, with some extras. The railed handguard/upper has a top rail that extends the full length of the receiver, from the end of the charging handle to the back of the folding front sight. That's right, a folding front sight. As a result, the top rail of the Colt 6940 provides lots of rail-estate, places to bolt on your optics, laser, light, etc. And the sides, well, there's even more room there, once you've maxed out the top rail.

The folding front sight is a sturdy and lean affair,

lacking extraneous parts, gizmos or cosmetics. Very spartan. The front sight has a detent to keep it upright, but it doesn't lock. The front sight housing looks like someone took a lot of trouble to make it as minimalist as possible, and not look (or be) busy. I like it. On the rear is a Matech BUIS. My friend Dave Fortier tells me they have a reputation as being somewhat fragile, but I have a hard time believing that. The body is a sturdy casting, and the rest of it is dead simple and appears solid. Still Dave tells things as he sees and hears them, so I'd be careful. After being involved in a head-on collision on the freeway, your Matech may not be useable afterwards, but then you might not be, either.

When it was a new thing, the Matech was hard to get, with the company sending every one they made to the government. Now, they've clearly caught up, as you can find it lots of places. The big advantage is this: it has a clearly visible, ranging adjustment for the rear sight. You want 400 yards? Move the lever to the 400 figure. Back to 200? Move to 200. No counting clicks, no turning the rifle sideways to see what range you're on. And when folded, it is as low a folded sight as anyone makes.



You can adjust the length of pull on the Colt stock, not that it looks all that durable.



The military request for a new light automatic weapon basically posits a 5.56-caliber BAR.

The upper is marked with the relevant patent number, and has a forge mark that is new to me: the letter “C” with a box a short distance from it. Colt has had various forges stomp out the uppers and lowers for it through the years, and it is not surprising that they have either a new forge company, or a new forge marking, for the monolithic uppers. The patent number is one assigned to Colt, and in reading it I find that Colt is even more clever than I had previously thought: the lower rail section of the monolithic upper is removable. Remove the quick-detachable sling stud, then press in the recessed latch on the underside, right in front of the magazine well. Slide the lower rail section forward (the book says 3/8-inch, it can be a fiddly) and *voilà!*, the bottom rail is off.

What, are you more surprised that Colt made the rail removable, that they patented it, or that I read the owner’s manual? Why do this? Because Colt has a great deal invested in government and law enforcement contracts, and those users (more so the military) often install M203 grenade launchers on rifles and carbines.

It would do no good to make a special new model that lacked the ability to mount such a useful piece of gear.

As for the rest, it is pure Colt carbine. The barrel is 16.1 inches long, with a 1:7 twist, hard-chromed and parkerized. On the LE guns (and the 6940 is in the LE stable) the barrels come with a flash hider. The non-LE guns do not. However, while Colt “suggests” that the rifles are for different customers, they do not restrict wholesalers or dealers from selling them to any lawful owner. So, your gun shop can track down and sell you an LE-only Colt, if they wish to go through the work. If they say they can’t, it isn’t because of anything Colt does to prohibit it.

The stock is your basic mil-spec diameter M4 type tele-stock with four positions, and the internals are AR-15 semi-auto only. The hammer is the Colt notched-top hammer, and the carrier is an M16 carrier. The buffer is an “H” buffer. The lower is the newest Colt approach: it uses the double push-pins for takedown, since Colt abandoned the offset screw up front some years ago. Also, the hammer and trigger pins are the original,



With a new rollmark, the lower is ready to receive the parts it needs.

small-diameter pins. Finally, instead of the damnable steel auto-sear block pinned in place, Colt simply leaves a web of aluminum there. So, no DIAS, no mods, at least not without making it obvious you have done so. Finally, the cardboard box containing the rifle also has a set of rail ladders, owner's manual, chamber and bore brush, sling and a pair of twenty-round magazines. (As I recall, the non-LE rifles, in addition to coming without flash hider, have nine-round magazines packed with them.)

Finally, the full-up weight of the 6940 is not, as you'd expect, heavier than a plastic-handguard M4 clone. In fact, it is a bit lighter, listed at (and actually weighing in at, to my surprise) 6.85 pounds bare. Of course, by the time you add a sling, magazine, ammo, and optics, it is going to be closer to eight pounds, but that is life in the modern world.

In function, it was everything you'd expect of a Colt-built M4 clone. If you're looking for a railed handguard, free-floated barrel carbine, this is a very good one to

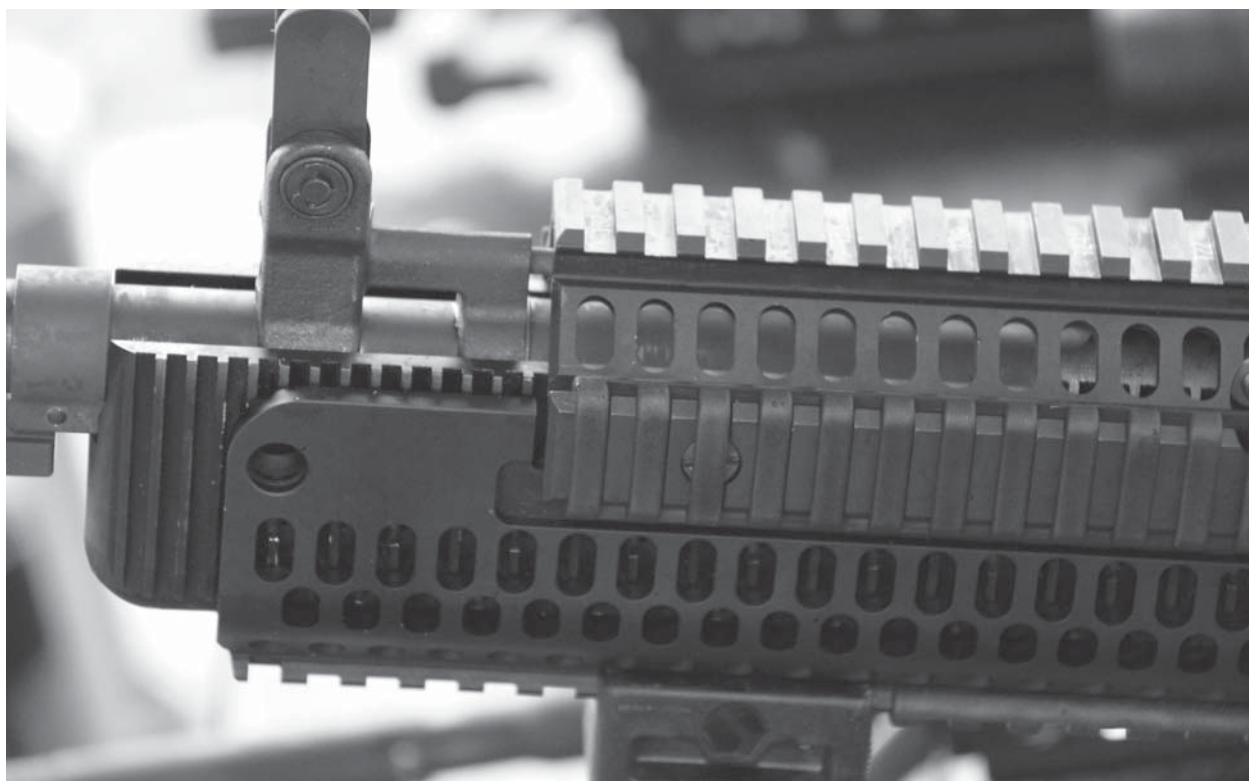
have on your short list. Will the government buy it? I only need to remind you of one thing: it isn't mil-spec, because there is no spec for integral-railed uppers.

Now, this isn't a piston-driven upper. And I'm not sure you could even marry a piston system to it, although I'm really looking forward to seeing what might fit. But, if you are not one of the piston converts, and the traditional DI system is plenty good enough for you, the 6940 offers a whole lot.

And unlike the DoD acquisition system, which doesn't acknowledge its existence, you can buy one of these, even if Colt won't be able to sell any to the government. Get one while you can, for they may not last long.

Further Colt R&D

I can only imagine how the next Colt item got built. Imagine a room, with a Colt representative and someone or a group of someones from the military in conference:



Extra handguards, a heat sink, and the folding front sight that appears on the monolithic carbine.

Dusty Trigger-Puller 1: “The regular rifles are too effin’ long, the M4 is still long. Make it shorter.”

Colt Rep: “We make them with shorter barrels.”

DTP 2: “No, we’d lose muzzle velocity, and that means we can’t whack hadji at distance. Make the stock fold.”

CR: “We can do that. We’ve got this new upper, it is more reliable, and it allows us to go with a folding stock....”

DTP 1: “No, it has to use the regular upper assembly. We can’t be changing those, we have to maintain interoperability.”

DTP 2: “And can you make it more compact, too? Even folded, the bottom of the stock digs into everything...”

CR: (Thinking to himself ‘These guys want the sun, the moon and the stars. What are they on?’) “Sure, we have some R&D stocks we’ve been working on.”

DTP 3: “Cool. Next, we want you to build an M4 that is as durable as a SAW. SAWs are too heavy, but the M4 doesn’t hold up to an afternoon of full-auto fire.”

CR: (‘What did I do to deserve this job?’) “We’ll look into that, but I wouldn’t get my hopes up.”

Which may all be my imagining, as my impression of the process is, as you may have gathered, perhaps a bit uncharitable. In any case, at a recent industry gathering, I had the occasion to handle a new Colt folding stock. In order to maintain the use of unmodified uppers, Colt had to figure a way to fit a folding stock onto the regular buffer tube – which they did by making the buffer tube shorter and changing the buffer and spring. The Colt rep was not about to let me disassemble, photograph and measure the internals, so I have to go on what I could see from the outside.

The stock is a heavy-duty plastic (oops, polymer) affair that has a buttplate that folds, and then the folded assembly hinges to the left, to rest alongside the receiver of the carbine. It also adjusts for length, with half a dozen settings to adjust to body size, gear and body armor layering.

I know what you’re thinking: a folding stock, at last. Finally, a carbine as compact as I want. Well, if in your mental 3-D construction you’re thinking of something as compact as a PARA target rifle folder, or the folding stock on a paratrooper FAL, fuggedaboutit. The folding stock on the Colt is the full diameter of the buffer tube – or the



The Colt monolithic carbine not only is a new thing for them, but it is patented.



The Colt comes with the mil-spec and standard issue Matech rear sight.



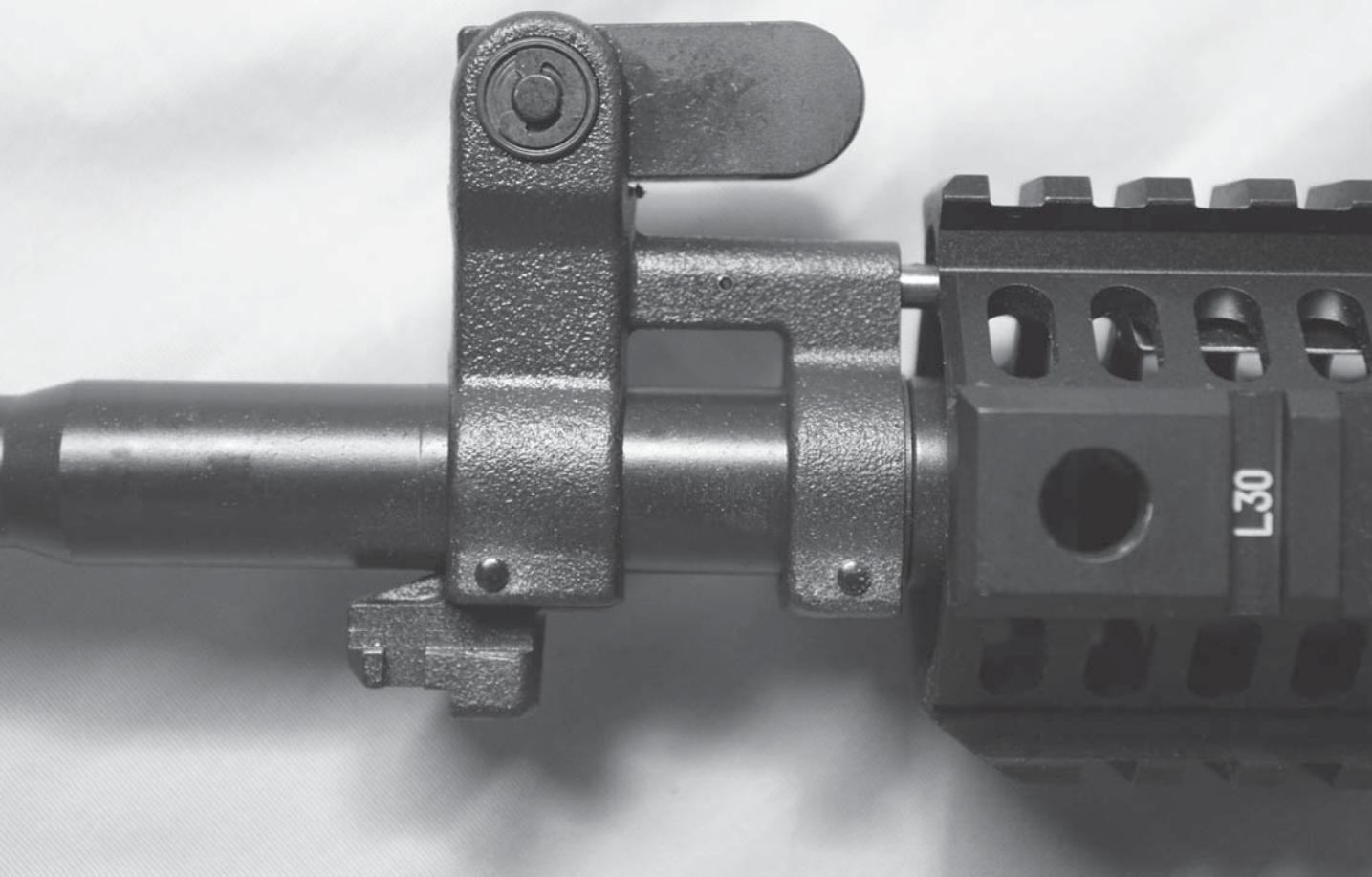
Machined from a single forging, the upper has the top and side rails as an integral part.

buffer tube were it still full-length. So, any compactness you get from making it shorter, you lose on making it thicker. The whole thing couldn't be more complicated without installing electronics of some kind in it.

Plus, the folding and unfolding of the stock requires a whole lot of motions. It isn't like the folder on an AK or FAL, where you can simply unlatch and swing or just slap it open like on a Galil. No, you have to push this button and swing this open, and then press that button and swing that around. Personally, were I in a situation

where I had the possibility of being shot at, I'd seriously consider whether the compactness was worth the folderol and gyrations to get the bleeping thing open.

But that's just me. As for the new stock, I don't know if Colt will offer it. As it requires a new buffer tube and internals, it may just be too much of a hassle to make, stock and support. But if you're offered the chance at one, you might just want to buy it anyway. As a collectible, some years down the road, it may well be worth a lot more than you paid.



The new folding front sight is very spartan, utilitarian, basic and even elegant.

The New BAR

OK, for a bunch of guys who have been doing this for a couple of centuries, and individuals who have been doing it for decades (and have decades more experience to call on, if needed) sometimes the services are as indecisive as a bunch of old ladies trying to decide who has to next host the bridge club. (My apologies to old ladies who are not so indecisive.)

Cast your mind back to when the M14 was adopted. The plan was to have one rifle do all: it would be a rifle, it would be a submachine gun (now that was a real stretch) and it would be a light machine gun. It would replace the M1 Garand, M3 “grease gun,” and the BAR. Well, we all know how that turned out. When the Army adopted the M60, hopes that it would be the replacement for the BAR were dashed, and rightfully so. The M60, for being relatively light (and I stress “relatively”) for a GPMG, was portly for a squad automatic weapon.

It took the Army until the mid-1980s to come up with a suitable SAW, the M249. A whole lot of that time was spent in the fruitless, pointless and idiotic argument over possible adoption of a SAW with an intermediate chambering, perhaps some sort of 6mm. (Had the Army learned nothing from the Japanese experience of WWII, with more than half a dozen rifle, light and heavy machine gun calibers to support?)

However, the M249 is not well-loved and there have been advocates all along of a box magazine-fed SAW, and not a belt-fed one. So, the recent push has been for the Individual Automatic Rifle. Yes, a 5.56 BAR. However, in typical military acquisition fashion, they insist on interoperability with the existing rifles and carbines. Now, I can see insisting on the same magazines and ammo. That way, your IAR-guy can use magazines from the rest of the squad.

But to insist on an IAR based on the same rifle being used? When any competent small arms designer could

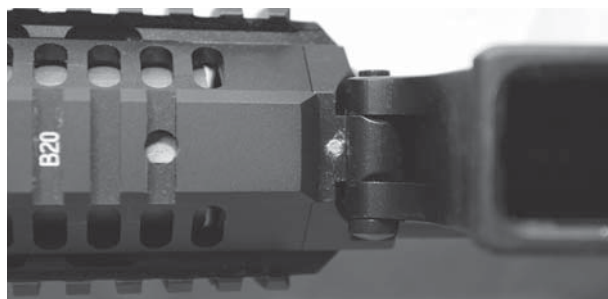


The castle nut is staked, as you would expect from a rifle built to mil-spec, except for lacking the full-auto parts.

produce an anvil-tough design for a 5.56 BAR without working up a sweat? And in case you were wondering, yes, Colt has been there already. They offered the Army a heavy-barreled (and quick-change barrel, too) auto-only M16 back in the 1970s. The Army wasn't interested. Now the Marines are asking, and in response, Colt made a new one, the IAR.

The IAR fires in either semi or full auto, and the mechanism is such that when the selector is on semi, it fires from a closed bolt, and when on auto, from an open bolt. That does not mean that if the bolt is forward and you select "auto" that the bolt flies open. Nope, it stays open after you fire your burst. Open-bolt autos cool faster when hot and are less prone to cook-offs when overheated than closed-bolt autos.

Colt got very clever on this one, and while they wouldn't let me look inside (and would you?) they were also pretty closed-mouth about how it all progressed. You see, the upper receiver of the IAR is the same as that of the LE6940: the monolithic upper. On the



The lower handguard is retained by a spring-loaded plunger at the rear of the rail.

IAR, Colt replaced the lower rail with a larger railed handguard containing a heat sink, to make it better-able to withstand full auto fires, and made room for a bipod. Using a railed handguard is smart, because in modern military usage, everything has to have room for an illumination device ("light" to the rest of us) and a laser targeting designator. So, any prospective IAR has to have room for those.



The owners' manual states that a loaded cartridge or a pin punch can be used to press the handguard lock out of the way.



The typical result of trying to use a loaded cartridge; those big fat liars said it would work.

The lower is your basic Colt M16A2 lower, with a tele-stock on it, the same folding front as the monolithic carbine, and a Matech BUIS on the back end. With the rail, you could mount optics on the IAR, allowing a skilled shooter to put a short burst, or even single shots, on target at distance.

In his monograph, "Increasing Small Arms Lethality in Afghanistan: Taking back the infantry half-kilometer," Major Thomas Erhart points out that modern soldiers can't shoot. Oh, it isn't their fault, the Army simply hasn't the time, budget, ranges, staff or willingness to actually teach people how to shoot effectively past about 200 meters. The qualification course involves shooting on hit-sensitive, computer-controlled plastic targets out to 300 meters. However, training and supervision NCOs commonly tell shooters "on the bubble" to ignore the 250, 275 and 300 meter targets, and save those rounds (they get 20 rounds for 20 targets) to "make sure" they get hits on closer targets. After all, passing is only 12 (or 13, or 14, pick a

number for this year's qual course) and wasting shots at 300 meters isn't smart.

With a shooter who actually came into the Army with some shooting skills (and who hasn't had them trained out of him by the "instructors") a scoped IAR would be very useful in whacking pesky Taliban shooters at 600 meters.

But what the Marines (and to a lesser extent, the Army) want in the IAR is something lighter than the SAW that provides fire support, suppressive fire, and increased volume over the rifle, without the weight of the SAW, the belted ammo, and the hassles of belted ammo used in what amounts to an individual weapon.

Now, the IAR isn't the improved M4 SAW replacement, despite what Dusty Trigger-Puller 3 wanted. It is the size of a full-sized M16, and the weight, while a whole lot less than a SAW, is still heavy for a 5.56 rifle. At 9.5 pounds, empty, it is a lot lighter than the 17 pounds of the SAW. The seven pounds difference is a lot of ammo.



Despite the AWB/94 having sunset in 2004, Colt still marks all of its lowers with this stamp. You can safely ignore it in all states where free men live.

For us, it means increased R&D at Colt, and perhaps a chance at some of the gear trickling down. No, not that you'll get a chance to own an IAR some day, but if Colt makes them for the government, there is the possibility that production over-runs might get out to those of us who actually pay for this stuff: the taxpayers.

21st Century?

And for those who have been asking, yes, Colt has made and offered piston systems to the government. And, no, the government isn't interested. Once someone with enough pull gets it into their head that a piston system is a good thing (perhaps some senator who thinks he or she actually knows something about firearms),

that might change, but until then, piston systems in the military are wishful thinking. Yes, the recent go-rounds of the IAR have indicated that this or that piston-based rifle is in the final running, but we've all seen that before, too many times to count.

Colt makes darned good rifles. Now that they are small pivot-pin and double push pin lowers, they're worth the cost. Buy one.

DSA

CHAPTER 18



The DSA ZM4, a solid and high-value DI-driven carbine.



The barrel is fluted. Some say fluting doesn't work. It does, but it is up to you to determine if the benefits are worth the cost.

Located in the People's Republic of Illinois, DS Arms makes a wide array of AR products. And yes, they actually make things, not simply assemble parts made by others, as some have reported. How do I know? I visited them and watched the machines in action. Why Illinois? Because a couple of generations ago, when we were the Arsenal of Democracy and arms were the tools of free men, Illinois was a firearms-making epicenter.

Located in a plain old industrial center, in a building you wouldn't give a second look were you to drive by, DS Arms is chock full of machines, parts, tools and staffers. Alongside the complete array of FALs they make are ARs of all the DI types. No piston guns yet, but that is simply a matter of the DI guns being what most buyers want, despite the agitation of the piston crowd.

What DSA sent me was their mid-length carbine. Starting with a flat-top receiver and a semi-auto lower, they put a mil-spec diameter buffer tube on the back with an M4 type slider. The trigger guard is a Magpul oversized one, so you can fit a gloved finger in there. The internals are given the super-click NP3 treatment, so cleaning will be a snap, and the self-lubricating benefits of NP3 are always nice to have. The mid-length gas system is one where the gas port is in between the locations of the carbine and the rifle, so you get less of the carbine "snap" and more of the rifle "push" in the gas flow. The idea is to make something that shoots softer than a carbine, but still has the handiness of the 16-inch barrel.

So far, we're talking pretty normal gear, if you are



The ZM4 carrier is hard-chrome plated, making it easier to clean.



DSA machines their own receivers, on state of the art CNC machining centers.

willing to accept the NP3 bolt and carrier as “normal.” (And in this day and age, yes, it is normal.) But the barrel of the DSZM4 midlength is one of those boundary-stretching items that make you sit up and go “Huh?” The barrel is your usual super-tough ordnance steel, 5.56 chambered, tested and gauged, and then given a nitride treatment.

On this model, the barrel is also given a fluting treatment. Now, there are advocates for, and detractors of, fluting. Basically, it is an attempt to get something for nothing. Well, not nothing, but at little cost. The fluted barrel is one that has grooves machined the length of it. These grooves act to stiffen the barrel and increase surface area for faster cooling.

Let us not misunderstand: the barrel is stiffer than it would be, were it a plain barrel of the same weight. It is not stiffer than a barrel of the original diameter. So it's lighter than the heavier tube but stiffer than the lighter weight would otherwise be. The increase in surface area is not great, but it is some, and thus it must increase



The NP3-plated charging handle has shipping grease around the area where it rubs on the receiver, so it won't be worn while on display.



The trigger guard on the ZM4 is the modern, bowed large-finger or gloved guard.

the cooling rate. However, it will not keep a barrel fired extensively from overheating. It just takes a bit longer to overheat and cools down a smidge faster. Add the nitride treatment, and you have one very tacti-cool barrel.

Nitride is the general name given the various proprietary treatments that go by the names Melonite and Tenifer. Applied to a suitable steel (not all alloys are suitable for all treatments and coatings), the result is a barrel with a surface impervious to corrosion and harder than a cheap, imported hand file.

I talked to Marc Christiansen, the Sales Manager at DS Arms, about it, and he couldn't be more enthusiastic. The nitride-treated barrel shrugs off corrosion, and the surface hardness ends up in the very high 50s on the Rockwell scale. In testing, they've had shooters who have kept match-grade accuracy well beyond the service life of a hard-chromed barrel. Some shooters have reported barrels that lasted into the 25-30,000 round range. Now, the 7,500-round service life of an M4 barrel is a low one due in part to the occasional (and sometimes more than occasional) use of full-auto fire. Even if that cuts in half what you'd get from a barrel treated with

any care at all, and fire only in semi, that still means the nitride-treated DSA barrel is double the life of a chrome-lined mil-spec barrel.

Even if a DSA nitride barrel costs twice what a mil-spec one does, and "only" extends the barrel life by 10,000 rounds, that is significant. So, you spend \$300 extra (just to pick a number, to give this some heft) on a nitride barrel. And it gives you 10,000 rounds more service, which, if the lowest cost of ammo at the moment is to be used, means you get \$3,000 more ammo use out of the barrel than you otherwise would.

Oh my.

Now, I have not put anywhere near 25-30,000 rounds through this rifle. I haven't the time, and the ammo makers, as kind as they are, cannot send me anything like that much ammo just for one rifle. But the ammo I have put through this rifle has shot superbly. When it arrived there was a white goop around the charging handle, at the rear of the upper receiver. This is simply packing lube, meant to prevent scratches while in the rack at a gun shop, or on display at a gun show or the like. It wiped off, and the interior was clean enough that



I didn't bother to do more than look down the bore to check for daylight. (You'd be surprised. I had a customer, years ago, who couldn't get a cartridge to chamber in his brand-new AR. Turns out the cardboard drying rod, left in the bore, was poking down in the chamber and

getting in the way. No, it wasn't a DSA. Ever since then, I check for daylight.)

You can get the DSA barrel, if you already have an AR and you're getting close to wearing out your barrel. If you do, do yourself a favor: buy a DSA bolt with it.



The barrel is fluted. Some say fluting doesn't work. It does, but it is up to you to determine if the benefits are worth the cost.

They can check the headspace to make sure it is correct. You see, the nitride treatment (which all the DSA ZM4 barrels receive) is so hard, you aren't going to be using a chambering reamer to adjust the headspace, should you

need to with your old bolt. Besides, you're investing in a barrel that has the potential of outlasting your current, or any, bolt. Start with a new bolt, and don't risk your old one croaking on you in a match.



As far as fit and function are concerned, the DSA was superb. It should be, since they machine their own uppers and lowers and can correct a fitting problem if and when it arises without having to go screaming back to a sub-contractor. The staff knows how to build

rifles, I've watched them do it. And if you don't see what you want in the catalog, drop them a line. If they have the parts on hand for the AR of your dreams, they can assemble it just the way you want it.

Now, DS Arms isn't into calibers other than 5.56. If



DSA makes their own barrels from blanks. Here is a growing array of barrels slated to go into DSA carbines.

you want a 6mm, 6.5, 6.8 or such, there are plenty of other makers who will take care of you. DS Arms also doesn't do .308, the AR-10. If you want a .30 rifle from DSA, they'll be more than happy to build up the FAL of your dreams (or even your fevered imagination, if your

checkbook is up to it.) What they do is make DI-driven 5.56 rifles, in a whole host of configurations. This one just happens to be a very excellent sample of what they offer.

SPIRIT GUN MFG.

CHAPTER 19



Left, the 5.56, center and right 6X45, in varmint and medium-weight bullet loads.



The Spirit Gun Mfg 5.56, a very solid carbine.

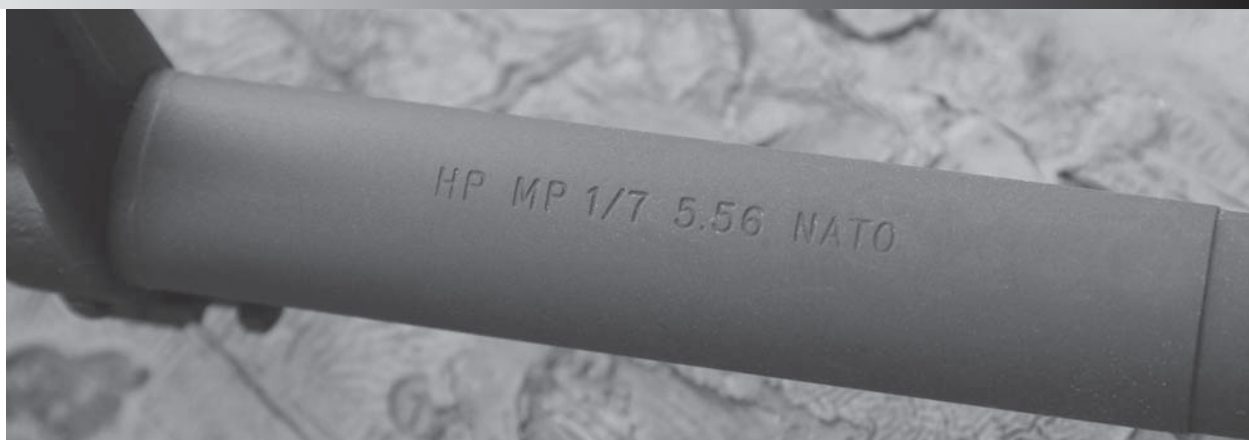
Just so we're clear on this: Spirit Gun Manufacturing is located down in Florida, not Arizona. They are a new builder, one of those who have combined two aspects of the modern American work ethic: they are good at business, and they love guns. So, why not combine the two, do good, have fun, and spread freedom? From a quick first glance, you'll see scads of Vltor gear on each Spirit Gun rifle and carbine (oh, and they make handguns, too) and assume, "Hey, these guys are part of Vltor." No, they are not.

While Vltor does the design, assembly, inspection and testing of each and every firearm, complete with full ISO 9001:2000 and AS 9100:2007 Revision B certification, Spirit Gun Mfg. are the guys who decide which options to offer and they're the ones who deal

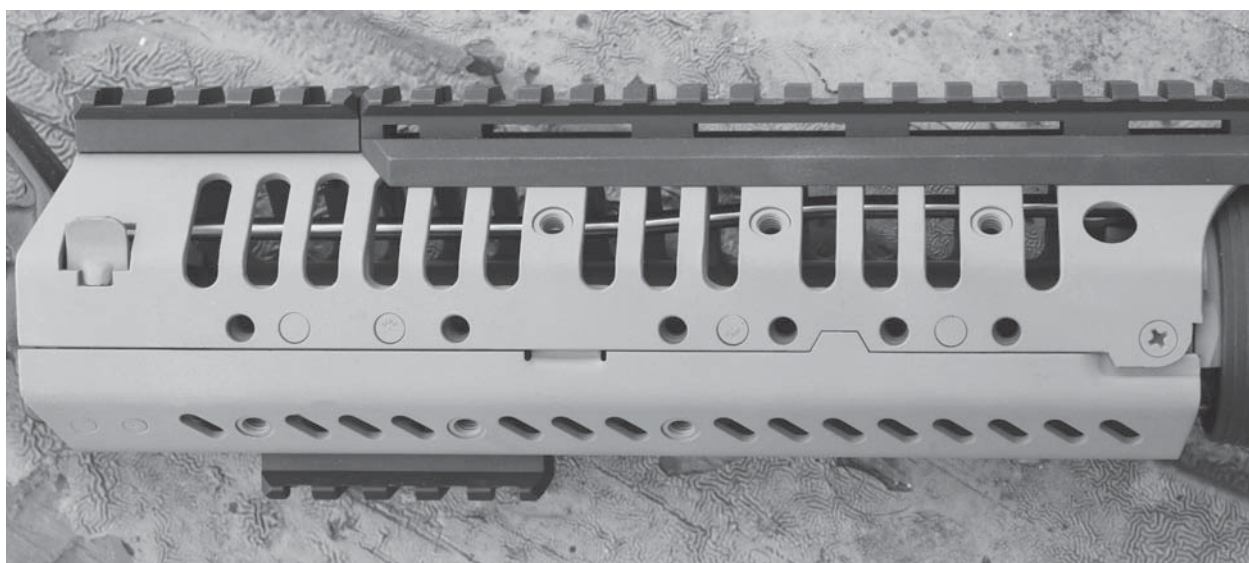
with shooters and dealers. They are a separate business, and not "a division of Vltor" as commented by one shooter I happened to overhear. Lest you think less of Spirit for that, I assure you that there are a whole bunch of companies out there in the AR world who are selling Vltor products. Spirit is just more aggressive about getting all the primo Vltor gear on their rifles they can.

To that end, for your enjoyment (and to be frank, mine, too) they sent along a pair of rifles for testing. The first is an SGM-17, chambered in 5.56.

The furniture is tan, which is what distinguishes it from the A15 and A16, which have black and green furniture respectively. The mid-teen models are all mid-length gas system guns, using the DI gas system. The chamber is 5.56, so no worries about pressure spikes on



The 5.56 Spirit carbine has a very good barrel: 5.56 chamber, 1:7 twist, chrome-lined. You can do a lot of good work with such a barrel.



The Vltor CASV handguard on the 5.56 Spirit Gun.

hot days. The 16-inch barrel is chrome-lined, magnetic particle inspected, and has a 1:7 twist. The flash hider is a Vltor.

The mid-length gas system starts with a forged and fixed front sight housing that is pinned on and is enclosed in a Vltor CASV-M free float handguard. The lower section is removable, for those of you lucky enough to have an M203 man-jewelry to install, and the CASV in all lengths is drilled and tapped (and the tapped portions are sleeved prior to tapping, so they will stand

up to lots of torque) so you can bolt on a section of rail wherever you want.

The charging handle is a Vltor BCM Gunfighter Tactical. At first it appears to simply be a handle with a bigger latch. But the internals have been redesigned so the stress of a quick and enthusiastic manipulation are not borne by the roll pin alone – the latch transfers the stress to the handle body. In the old days we never saw broken or bent charging handles. Now, with one-handed use of the handle, we're seeing it a lot more. This is Vltor



The Spirit Gun Mfg. rifles come with Tango Down magazines, an exemplary choice.

is designed to prevent handle failure.

The SGM-A17 is built on a Vltor MUR upper, with the forward assist and ejector lump installed. The bolt and carrier are national match, meaning they have been inspected and gauged to be as precise and on-dimension as possible. Nothing is perfect, but these come a lot closer than most.

The stock is Vltor, five-position and with the E-Mod stock on it. The E-Mod (Enhanced Mod) stock is an inch longer than your usual stock, and with the rubber pad on is a quarter-inch longer than the “Crane” stock, the one you see on M4s over in the sandbox. It provides more length of pull, and thus more cheek real estate (both good things for us tall guys) and gives you more leeway in getting your face in the right place for optics. The buttplate is slightly wider and longer and the toe has

a slight but noticeable pitch to it, allowing you to do the “bazooka” hold that many like, without feeling as if the point of the stock is being driven into your collarbone. The battery compartment isn’t a tube, so the batteries aren’t banging back and forth against each other’s contact parts, but they ride side by side. It’s waterproof, too.

The BUIS is a Midwest Industries folding sight that snugs up right behind the top rail of the CASV free float handguard. The SGM lower has a very clever retaining plate on the back of it. In addition to holding in the takedown pin spring, and providing a lock plate for the castle nut it has built-in quick-detach sling swivel sockets, three of them, one on each side and one down below in the center, under the buffer tube.

The pistol grip comes from Tango Down, as does the magazine included in the carton.



The rear receiver plate has built-in quick detach sling swivel sockets.



The retainer plate is properly staked to the castle nut.

The internals are all mil-spec, and as a result if you are the least bit familiar with the AR-15 in any of its forms, you'll know how to take down, clean and maintain the SGM-A17, despite its racy looks.

The CASV top rail provides a very convenient location to clamp on my scope (which is what it is intended for) and thus get down to the serious work of testing – the serious, monotonous and uneventful testing, as it turned out. The A17 simply refused to do other than what it was intended to: shoot bullets exactly where you're aiming, without fail. Now, while this comes in a compact and handy package, weighing in under eight pounds empty, and being the same size as an other M4gery, it does not come inexpensively. At an MSRP of \$2500, some might object. First, banish all thoughts of the \$600 AR you bought back when Reagan was still in office. Inflation alone has made that a \$1200 purchase today. And, that rifle you bought, did it have a chrome-lined 1/7 barrel, a flat top, a free-float handguard with rails? I thought not. So, take your \$1200 AR, add in all the extras, and you'd probably be over the Spirit cost, and you'd have to do the rebuilding work yourself. No, make no mistake: this is a great deal.

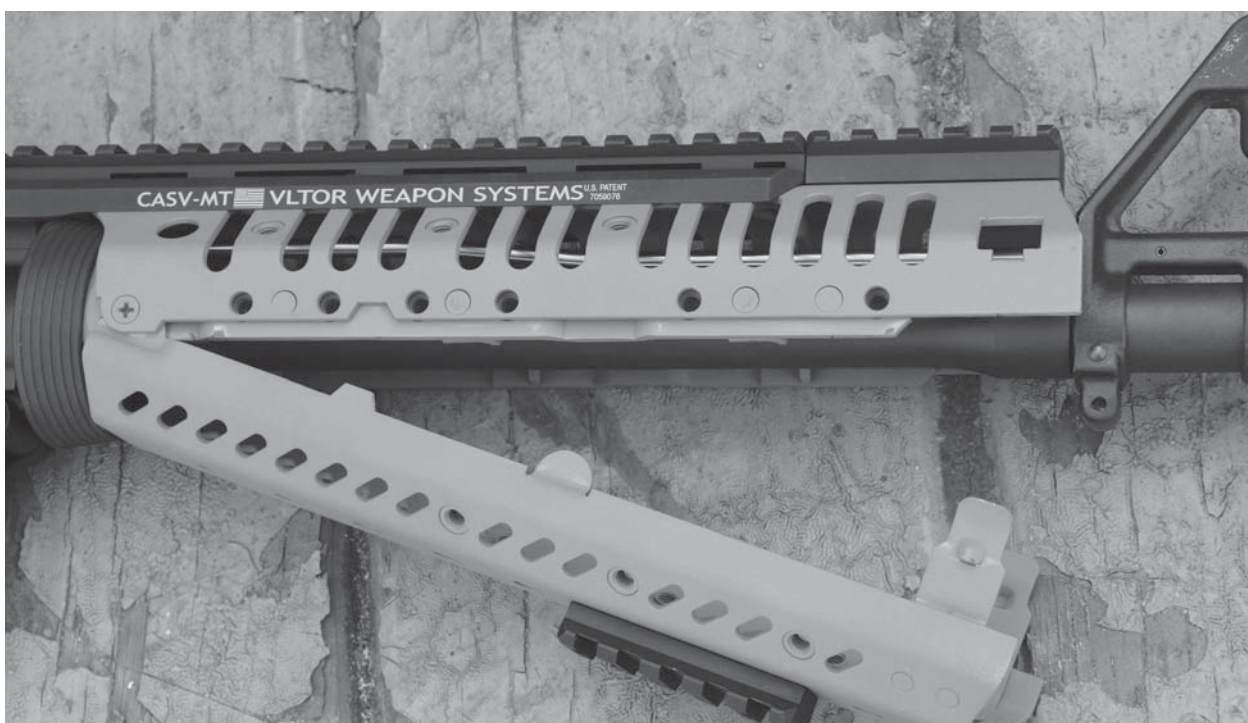
The second rifle Spirit Gun sent me is something completely different. Well, as different as you can be and still be in the AR-verse. The SGM A-48 is a rifle built around a new/old caliber. The barrel is a stainless tube chambered in 6X45, with a 1:9 twist and a Vltor flash hider on the end. You can have it in 16, 18 or 20 inches, which adds velocity but the accuracy is still the same: superb. With the longer two barrels you can have a rifle-length gas system instead of the mid-length the 16-inch is built on.

The gas tube is plugged into a low-profile Vltor gas block, and the gas system and barrel are held in the most excellent Vltor VIS3 upper. The VIS3 upper is a monolithic upper (but using high-tech fabrication and welding, starting with two parts) that has integral rails on the handguard. Also, the lower half is detachable, and you can install an underbarrel accessory (but why would you want to?).

The front and rear sights are indicated as being Midwest Industries, the rear being their SPLP, and the front being their Quick Deploy folding front. However, on the rifle I received, the front sight was the Vltor VST with sling swivel sockets. The stock is a Vltor



The excellent Vltor EMod stock, here on the 5.56 carbine.



The CASV forearm has a detachable bottom half, for those who have some sort of barrel-mounted accessory they want on their rifle.



The 6X45 is set up in a similar fashion, and with the same level of quality, as the 5.56.

Modstock, with five positions and storage compartment. The receiver has the three-location quick detach sling sockets, and the front sight assembly has sockets, as does the stock. Given all the sockets there, you could attach more slings than an octopus could make use of.

As mentioned earlier, the big advantage of the 6X45 is that it uses the exact same bolt and magazines as the 5.56, needing just a premium barrel to deliver the goods. Which this one is. Along with the rifles, Spirit Gun sent ammo. Not 5.56, which is pretty common (or at least it was, until the hoarders started stocking up.) For that, they left me to my own devices, which are up to the task. But, as for the 6X45 ammo, they sent along a supply of newly-loaded ammo from Black Hills; 85-grain Sierra Matchking and 62-grain Varmint Grenade. Wow.

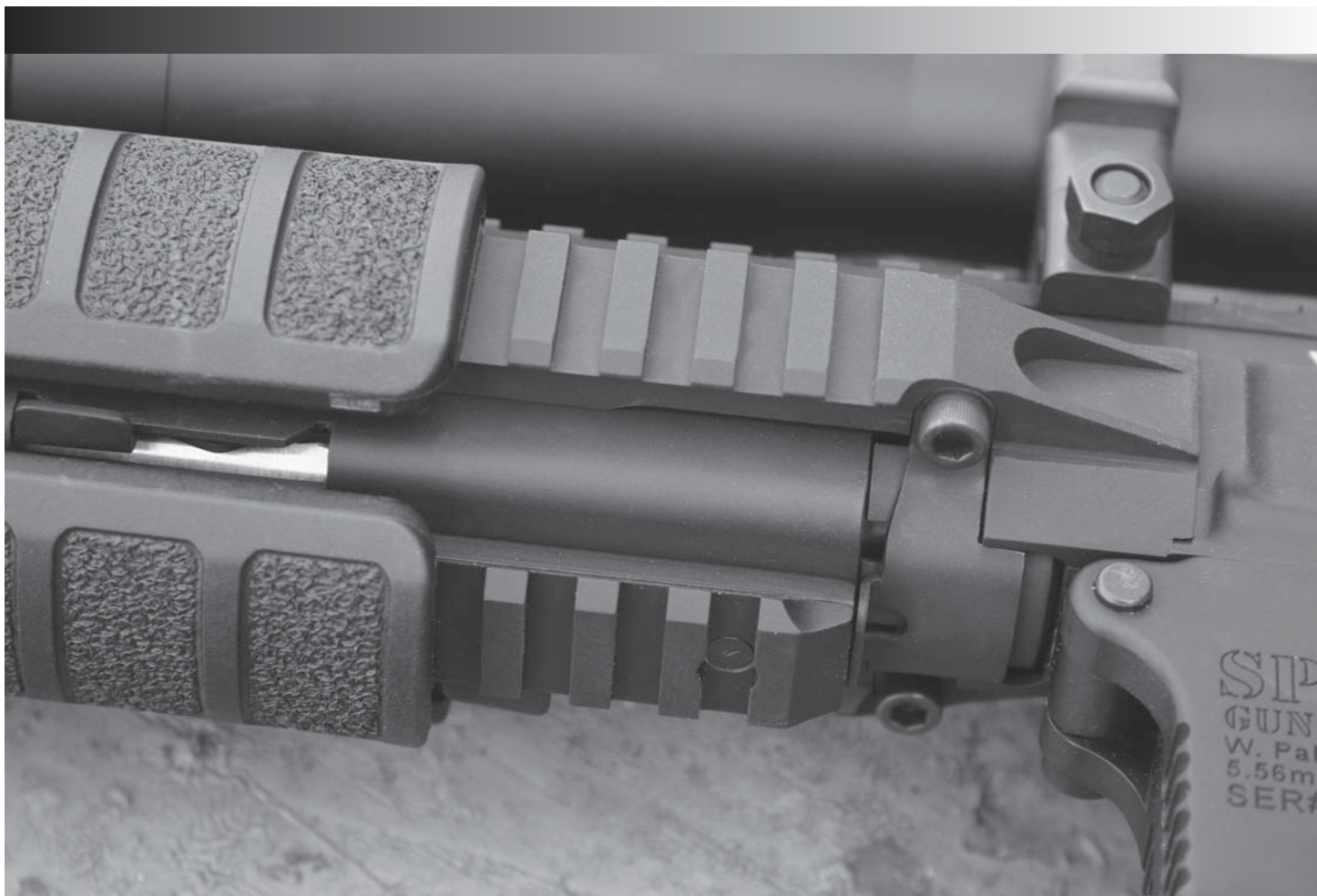
First of all, this stuff, and the rifle, shoot brilliantly. Sub-MOA was the order of the day. The match barrel and national match bolt and carrier obviously were doing their jobs, as was the Black Hills ammo. With the Leupold Mark 4 on top it was not going to be a svelte and lightweight rifle, but not everything has to be a featherweight to be useful. In fact, were I snugged down at a bit of concealment, hosing the unwary in a prairie



The 6X45 came in a Vltor VIS-3 upper receiver, an excellent option.

dog town, I'd want some heft. It would dampen the felt recoil of a case of ammo in a day I'd be expending.

Were I trying to deal with unruly Taliban, the weight of this 6X45 might be a different story. Having spent entirely too much time hauling it around, I'm sure I'd want something lighter in heft, which Spirit



The VIS-3 receiver is integral, railed, free-floats the barrel, and is a tough one to beat.

Gun can easily do. Meanwhile, it would still be a step up in delivery over the 5.56. Using a 95-grain Sierra Matchking, at 2600 fps with a 300-yard zero, I'd be 75 inches down at 600 and still have 1560 fps to deliver. With a 5.56 carbine, firing the Mk 262 Mod 1, a 75- or 77-gr. FMJ at 2800 and the same zero, I'd be 72 inches down at 600 and be bringing 1490 fps to the party. In other words, for a bit more thump on the shoulder, I'd get a bunch more downrange. Or if I were not dealing with Taliban, but instead whacking Bambi in the woods, then I'd go with a Sierra 100-grain Gameking, and poke it along at a relatively sedate 2550 or so. That would put any whitetail that ever walked the woods all four hooves in the air, with a well-placed shot.

Why didn't the Army go with a 6X45 rifle in the mid 1980s, when they upgraded to the M16A2? Beats the heck outta me.



The Vltor folding front sight gas block, here with the quick-detach sling swivel socket option.



Vltor flash hider, a 6X45 stainless barrel with a 1:9 twist, and you're set to shoot for a long time.



But you are not bound by the inane self-imposed restrictions the DoD saddles itself with. You can buy a 6X45. In fact, you should probably buy this 6X45 if you want a military-looking rifle that can be both a varmint rifle and a deer-hunting rifle. And if you already have an AR, and just want the caliber, Spirit Gun makes and offers 6X45 complete uppers for you.

Spirit Gun also does handguns, a very wicked-cool 5.56X45 AR-based handgun. However, as this is a rifle book, we'll have to leave it for later. Just thought I'd tempt you with a morsel.



The 6X45, with a selection of Black Hills ammunition for it.
Or you can make your own from .223/5.56 empties.

CHAPTER 20

LES BAER



It may look like a mil-spec trigger, but it performs much, much better.



One of the most-excellent Les Baer rifles. This one is in .264 LBC, a new offering from Les.

In the AR world, there are those who make everything (very rare, really), those who make the critical parts and depend on sub-contractors to make the rest (quite common), and those who simply have everything shipped in and then assemble it. What really matters is the attention to detail. If you depend on sub-contractors, and you inspect everything, gauge everything, and reject what isn't up to snuff, you will have quality parts.

Not all parts are equal. I can live a lot happier with a match barrel plugged into an off-spec receiver (well, if I do the fitting, anyway) than I can with a warped barrel in a perfect receiver. Best of all would be perfect barrel and perfect receiver, properly fitted.

In case you need any reminding, Les Baer makes his own ARs. He machines his own uppers and lowers,

his own carriers, bolts, carrier keys and extractors. He machines his own barrel extensions, profiles his own precision barrel blanks and then mates the two and reams the chambers to varmint/match standards. If you want a folding front sight, you can have a Les Baer-made folding front sight/gas block as well. In fact, of the critical parts that go into an AR rifle, Les makes all of them that go into his rifles. Pins, springs, things like that he doesn't make. The rest? He sweats over them. Les does not do things in a sloppy way.

Les goes to a lot of trouble to find the best available non-Les parts he uses. The triggers on his top-end rifles are Geissele two-stage target triggers that allow for a very crisp, precise, repeatable let-off. These are target triggers. Now, this is not the trigger you want to install in your M4 clone to ride in the car or pickup truck or the one you



The Les Baer .264 rounds feed from CProducts magazines, which come with the rifle and can be bought from Les or from CProducts.

will be using for defense around the house. This trigger is especially unsuited for those of you who are using a polymer-framed striker-fired pistol as a sidearm. The trigger pull between the Les Baer and your plastic sidearm will be too great. I have watched police officers using two-stage triggers on their ARs have accidental discharges on the firing line, having transitioned from their DA-trigger handguns to a match-grade rifle trigger. Of course, if you're using a Les Baer 1911, with an equally-precise trigger pull, then the transition is not a problem. And behind that Geissele trigger is a Les Baer-made pistol grip, of which you have your choice of three types.

The two Baer ARs I tested are both Super Varmints and are just the ticket for long-range, heavy-thumping varmint rifles, or medium-bore hunting rifles. One is chambered in 6.5 Grendel, the other in 6X45. Les is a licensed producer of the 6.5 Grendel, both barrels and rifles, and you have to work hard to get Bill Alexander's seal of approval in order to make 6.5 components. The ammo for the 6.5 came in Black Hills boxes, and the headstamp is "264 LBC-AR," indicating it was made by Hornady just for Les and his rifles and custom-loaded by Black Hills. The two Black Hills loads Les sent along

were topped with Hornady .264-inch 123-grain A-Max, and Sierra 123-grain MatchKing. As you may recall, the 6.5 does not feed at all from unmodified 5.56 magazines, so Les included some CProducts magazines for the 6.5. From them the .264 LBC-AR ammo fed without fault in the Super Varmint.

On top of the rifles, Les had mounted NightForce scopes. In keeping with the long-range varminting approach of these rifles, they were 5.5-22 power, and the reticles were designed for long-range work. Les and I differ in height by more than a foot. When I began writing, I quickly learned two things: Les sights in and test-fires all of his rifles before they are shipped, and he and I cannot use a scope mounted in the same place. So, before he sent me the rifles I asked him (actually, I pleaded) that he shove the scopes forward. "How far?" he asked. I said that nearly to the gas block would be a good start. Having sent me rifles in the past, Les remarked "You can't see a scope up there." But when they arrived they had the rear lens right over the charging handle, a workable location for me.

The Super Varmint rifles have 20-inch heavy barrels, and a Les Baer-made aluminum free-float handguard



OK, a rifle without a flash hider can be a slight tactical problem. However, if you want a flash hider on your rifle, Les can accommodate you. To be fair to Les, this happened only because the conditions were perfect for muzzle flash, and we got lucky in a day of photography.

slotted at 6 o'clock for the bipod mount. The bipod is a Versa-Pod, with a built-in hand stop as the bipod mount. You can locate the bipod and hand stop anywhere along the forearm you wish. The scope is mounted in Les Baer-made, cut-from-barstock-with-an-Electrical-Discharge-Machine-for-precision scope rings. Unlike typical rings, the Les Baer rings are cut to be precisely centered, and since the rail is machined by Les, they clamp on centered to each other. No scope bind here.

The Super Varminter comes with a standard A2 stock, but if you really wanted one you could prevail upon Les to install a five-position M4 stock on your rifle. Or you could pull it off and install a stock of your own choosing, since the lower receiver threads are the standard ones. Any stock assembly will fit.

A few years ago, tired of trying to get barrels of the quality he needed in the volume he needed, Les got tired of fighting with barrel makers and simply bought



The .264 LBC cartridges, loaded with Hornady VMax bullets, are tack-drivers and hard-hitters.



the equipment to make his own. So he takes top-quality barrel stock, deep-drills, reams, hones and then single-point cuts the rifling. That's right: the top-end barrels are single-point cut, not broached or buttoned. Now, when you're setting up the machinery to make barrels, you can't buy "just enough" barrel making machinery, you buy what it takes to make barrels. When Les makes more barrel blanks than he needs, he has AR makers and gunsmiths who are ready to take the "extras" off his hands. If you have a custom-made barrel on your superbly accurate AR, you may well have a Les Baer barrel in your rifle and not know it. Single-point cut barrels, while superbly accurate, are also slow and expensive to make. So Les also makes button-rifled barrels for his more-standard ARs. Don't think that because they are buttoned or intended for less-expensive

rifles, that Les lets them out the door as anything but brilliantly accurate. They are top-notch.

The M4 carbine uses the same quality barrels as the Super Varmint, just shorter at 16-odd inches. Also, in addition to the gas block having a Picatinny rail for a front sight, the M4 has a railed free-float handguard, where you can mount whatever you desire (or whatever the local game laws permit) without changing zero, accuracy or barrel harmonics.

The CProducts magazines are the same length as 20-round .223 magazines are, but they hold 14 rounds of .264 LBC-AR ammo. Once uncommon, .264/6.5 magazines can now be had in all the normal sizes, and in capacities from five rounds to twenty-five. So feeding your new Super Varmint won't be a problem.

The second super Varmint here at Gun Abuse Central



The recoil of the .264 doesn't push you around very much at all.

is chambered in 6X45, a wildcat of long standing. Soon after the .223 Remington appeared, benchrest shooters were popping the cases open to 6mm for heavier bullets. In the end, the 6X45 lost out on the benchrest ranges to more specialized cartridges, but it is a fine varminting cartridge and even a light deer round.

Les has provided Black Hills with a test barrel in 6X45 for load work-up, and long before you read this they'll have done all the work to generate all the loading data they need to provide you with the ammo you'll want. On the light bullet-weight side, the 6x45 offers an 85-grain varmint bullet that will deliver just a bit more drop than a 52-grain match bullet in .223, but with half again the mass. For deer hunting, a 100-grain bullet will have a point-blank trajectory out to 200 yards, plenty flat enough for any wooded hunting locale. If you're hunting

in the wide open, then the drop at 300 yards will be less than a foot and a half, so holding on the top of the back will get the job done. And if you are going to do just one but not the other, you have a choice in your Les Baer barrel for twist in the 6X45: 1:8 and 1:9.5. The 1:8 will get you the maximum accuracy out of the 100-grain bullets, while the 1:9.5 lets you wring a bit more velocity out of the 85-grain varmint bullets without causing bullet-destroying over-rotation.

The 6x45, being a necked-up .223, uses any standard AR mag of all the usual capacities, from any manufacturer. So you can simply use a regular five-shot mag for hunting (where the state regs require) or load up 20 or 30-round mags for prairie-dog hosing. That doesn't mean all magazines will work flawlessly. There is only so much you can expect Les to do for you. If you insist on trying to feed it using the crappy, surplus, tired magazines you've been hoarding since the Clintons first walked into the White House, prepare to be disappointed.

If you plan on loading your own ammo (and considering that these are not surplus-ammo candidates, a wise choice) Hornady makes loading dies for both the .264 LBC-AR and the 6X45, and Les will have lots of empty brass on hand to load up your own ammo, as well as all the loaded ammo on hand you might want. If you're like the rest of us cheap shooters, you'll buy enough ammo to have fun shooting, but not shoot it all. Then, you'll use your remaining supply of Back Hills/Les Baer ammo as a gauge against your reloading skills. If you're new to reloading for rifles, let me plant one suggestion: a power case trimmer. Rifle cases stretch, and they must be trimmed back to a certain length. The little hand-cranked trimmers get old very fast, and you'll



As a deer cartridge, the .264 LBC has a lot to recommend it. As a deer rifle, the lighter models from Les might be a good idea.

want power. That doesn't mean a three-horse Briggs & Stratton-powered trimmer, but if you're going to load enough brass for a suitable day hosing varmints, you'll want power.

Reloaders will be happy to know that neither rifle was hard on brass. The tight Les Baer-reamed chambers kept expansion to a minimum, and the rifles did not attempt to toss the empties into the next rifle range. They were politely and almost sedately deposited six to seven feet to the right, a little to the rear. Les clearly knows a thing or two about tuning a gas system and ejection cycle. Still, after half a dozen firings they will need to be trimmed.

I was quickly able to determine that all three of these rifles shot better than I did. The single-point, cut-rifle barrels are a joy to shoot, and the trigger makes the job easy. The Nightforce scopes are clear, sharp, and at 22X the 100-yard bull is nearly as big as a barn. Obviously,

the bullets selected are top performers when it comes to precision, and the end result is a set of rifles that can shoot sub-MOA all day long. How much under? I don't know. As I said, they shoot better than I can, and when the limiting factor is technique I have to admit I'm not a competitive benchrest shooter.

The rifles were all assembled on Les Baer matched upper/lower combos. Since he machines his own, Les can tend to the dimensional niceties of things like the fit of the radius between upper and lower at the rear, and the distance between the takedown pins and the mating edges of the upper and lower. They are not off mil-spec, they are simply made to be perfect with each other. If you want such a set, Les would be happy to provide you with a bare upper and lower, machined to fit perfectly with each other, to build your own AR. As a final lure to using a Les Baer matched set, they are



A Les Baer rifle simply oozes precision, top-notch craftsmanship, and attention to detail.

given a Bear Coat™ finish. Bear Coat™ is a Teflon-based baked-on finish that is more durable than plain old anodizing. It also offers extra lubricity that mil-spec anodizing doesn't.

Given the weight of these rifles, recoil was not at all an issue. On a lightweight M4gery, the recoil of a mil-spec 5.56 load can be a bit brusque. Nothing oppressive, mind you, but snappy. Despite the greater power of the .264 and the 6X45, the weight of the Les Baer rifles tames the recoil, making a shot from them simply a push, not a jolt.

Now, performance such as this does not come without a price. First, as mentioned, there is the weight. These are not stalking rifles. You are not going to find them at their best when ghosting through the cedar swamps, looking for bedded deer. They just weigh too much for that. However, from a stationary location, say

a blind, or a not-silhouetted ridge where you can look across a prairie dog town, they will deliver the goods.

And best of all, a lot of the components that go into the rifles we've been looking at are available individually. Do not, however, get the idea that you're going to peruse the Les Baer catalog or web page and order up things the way you want to the smallest detail. For instance, while you can have carriers in two different weights, you are not going to be able to order one parkerized. You can have it either weight, but they'll both be chromed. Bolts, you can have chromed or not. You can have LBC scope rings in two heights, but only in blued.

Les knows what works, and he makes what works to the highest level of precision he can. If you want something less, Les will be happy to let other people make it for you.

CHAPTER 21

NOVESKE



The Noveske 6.8, complete with PRI magazines for same. A hard combo to beat.



The Noveske 6.8, with its free-floated barrel, is a cool setup and a tack-driving shooter.

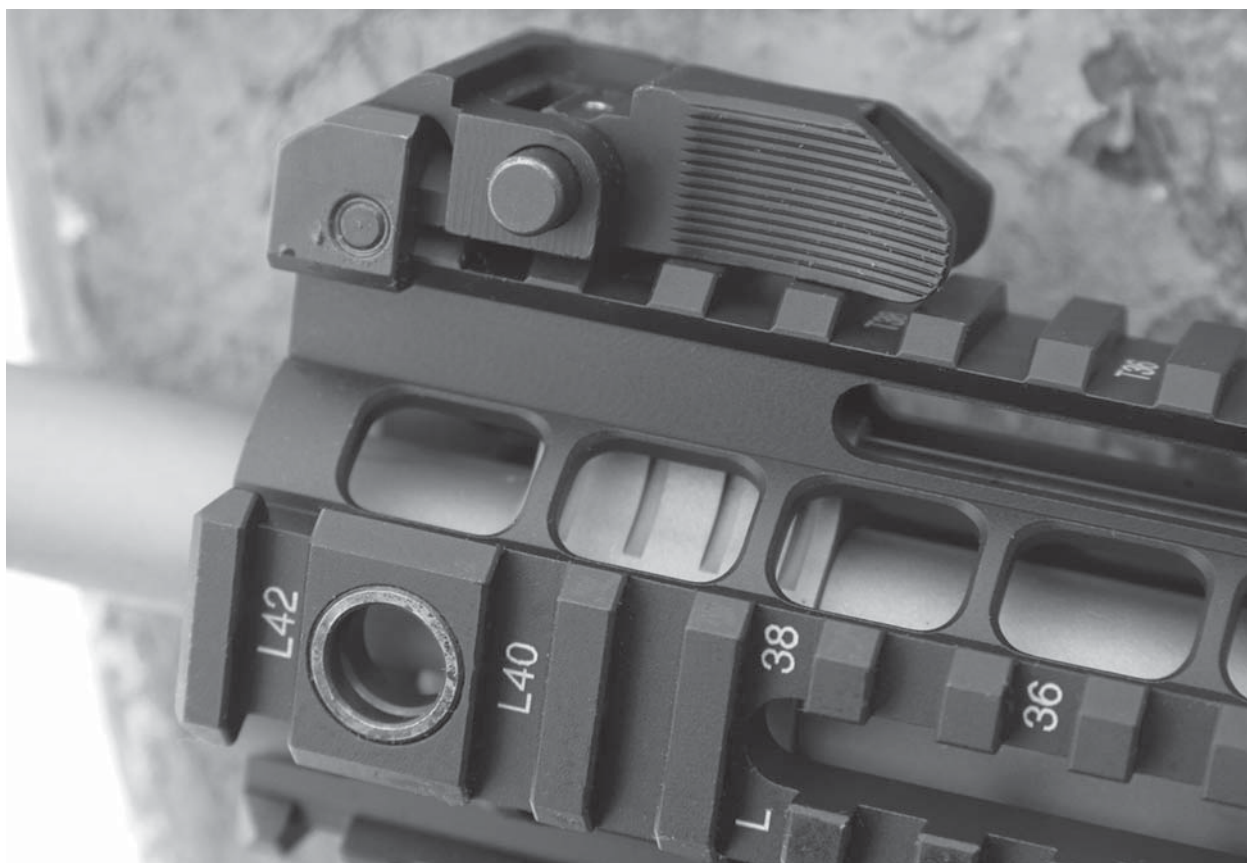
Located in Grants Pass, Oregon, Noveske makes AR rifles without apologies. When I first heard about them it was in the context of their KX3 flash hider. Starting with the flash hider/gas booster of the AKU-74S (commonly mis-called the “Krinkov” here in the States) they developed the KX3.

The AKU booster was designed to solve a little problem the Soviets had gotten themselves in to when they developed their 8.5 inch-barreled 5.45X39 carbine: gas flow. Remember our discussion earlier of the gas dwell time, and how it drives the gas system? Well, the 74s, with such a short barrel, had quite a high gas port pressure. But, the barrel being so short, the gas had little time to do its work. If they opened the gas port enough

to drive the system, they risked not only over-driving it, but also drilling such a large hole in the barrel that accuracy would go all to hell.

So, the Soviets developed their AKU flash hider, which was actually a gas expansion and trapping chamber, to allow for enough extra gas dwell time to drive the system.

What it also had was a curious effect on muzzle noise: it directed it. (Not that half-deaf Soviet troopers could tell, as hearing protection was a couple of decades behind us here in the West.) So Noveske took the basic system and refined and adapted it. The KX3 is basically a reverse cone inside of a cylinder, and it traps the gases inside the system long enough to allow for flash to



The low-profile gas block means you have to mount the front sight on the rail. No problem, as Noveske has done that with one of their own.

dissipate. It also directs noise away from the shooter. Not enough that you can shoot without hearing protection (and not so much that the BATFE felt compelled to call it a suppressor) but it does make the noise go “out.” When we first had a chance to try one, we tested that by having one of the crew alternately fire a KX3-equipped rifle on one shoulder, and a regular A2 flash hider-equipped rifle from the other shoulder. We walked and stood around it in all directions, getting as close to the line of fire as we dared. (Not very darned close, I might add!)

The noise sounded different from behind, but out in front it was louder than right behind or next to. Unless the bulk is too much for you, the Noveske KX3 is the most effective muzzle flash device, and it gives a bonus noise shifting benefit as well.

But, we’re here to discuss their rifles, not just the flash hider, however good it may be. Noveske offers a dizzying array of rifles, but there are a few things all models have in common. First, they do them with their



The free-float rail also includes quick detach sling swivel sockets, enough to mount enough slings for an octopus.

barrels, and their barrels only. I really think that if you called up and asked for, say, the 16-inch Recon with a Colt barrel instead, they’d probably just hang up on you. Second, all rifles have a free-float railed handguard. No



The Noveske logo, cut into the rear of the free-float handguard, the receiver, etched on the sights, it's everywhere.

M4 plastic handguards. And last, they don't do fixed stocks. All Noveske rifles come with a tele-stock, a Vltor of one kind or another.

For this book, I decided that I needed to try a different rifle than a plain old M4gery, so I asked them to send me a rifle in 6.8 Remington SPC, their R16-68, the Recon 6.8. What they sent was beyond "an M4gery in 6.8," as one detractor put it before I showed him the rifle.

First of all, it comes with a stainless Noveske barrel. (Big surprise, there.) That was the second thing I heard about Noveske rifles: their barrels. A John Noveske barrel was "to die for" good, and so accurate you simply had to describe the target to it and it would do the rest. The Noveske 6.8 barrel is stainless steel (as are all their

barrels now) and is chambered in the 6.8 SPC Mod 1 chambering, with extra freebore. The Mod 1 is what Noveske calls the SPC II chambering, which is the equivalent update to the 6.8 that the 5.56 chambering is to the .223 Remington. Combined with the 1:12 twist and polygonal rifling profile Noveske puts on it, you have a superb barrel with a twist fast enough to be accurate, but slow enough to ensure bullet overturning on impact. The original Noveske 6.8 barrels had the "Mod 0" chambering, or the original Remington/SAAMI specs. The earliest Noveske barrels were better than mil-spec steel, and given a much heavier chrome lining. But hi-tech stainless steels are superior in accuracy to a chrome-plated bore, so stainless it is.



Noveske chose the excellent Vltor stocks for their rifles. Easy to switch, if you need another.

The barrel is plugged into a Vltor MUR upper, with extended feed ramps (as M4 uppers have, but not all flat-top uppers have) for enhanced feeding. The gas system is mid-length, with the gas tube secured to a low profile gas block that is pinned to the barrel. The MUR upper has a free-float handguard with rails attached, and the two have an interface that locks the handguard to the upper, preventing rotation. The handguard, in addition to being railed and free-floating the barrel, has extra slots as weight reduction and locations to bolt on gear. It also has quick detach sling swivel sockets. The rifle, in total, has seven sockets, including one on the retaining plate at the rear of the receiver. If you can't get a sling attached to your liking with these options, I really don't know what to say.

Curiously, the flash hider is a very excellent Vortex, which hides almost as well as the KX3 does (and no slam against the Vortex) while being a lot more compact than the KX3. I'm sure, however, if you are ordering a rifle

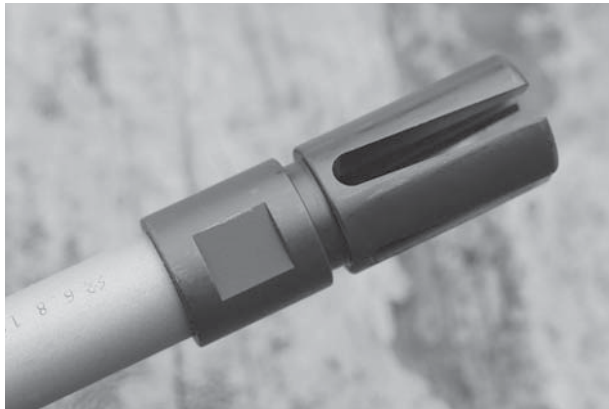
from Noveske and you want the KX3, they'll substitute.

Inside, the carrier key is properly and heavily staked, the mil-spec diameter buffer tube has the castle nut staked, and the buffer is an "H" buffer. The trigger internals are box-stock semi-auto conversion, with a rounded-top hammer and AR-15 trigger and disconnect. The stock comes from Vltor, the pistol grip from Tango Down, and the front and rear sights fold. The rifle ships with a 25-round magazine, and it's ready to go right out of the box.

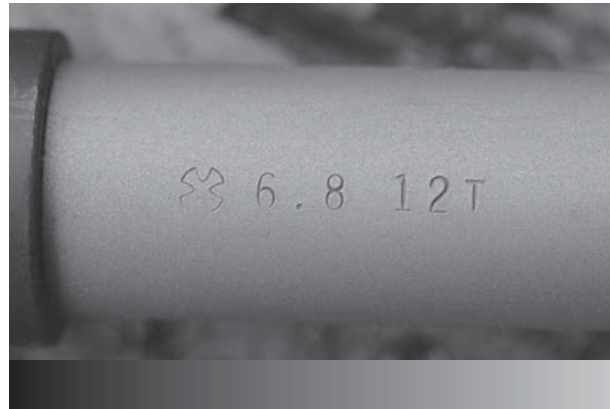
The trigger, out of the box, was a bit gritty and crunchy. That, however, is simply due to the mil-spec parts inside, and not because Noveske doesn't like good triggers. And as it is a small-pin lower, you can easily replace the mil-spec parts with the trigger of your choice. I figured, correctly as it turned out, that a bit of dry-firing and some range time would clean up the trigger. It did, and once I was done, dropping the 300 meter pop-ups was no problem.



The carrier key is properly, heavily and permanently staked in place, as it should be. If your key doesn't look like this, someone skimped on detail work.



The Vortex flash hider, one of the best. That is, if you don't go with a Noveske KX3.



The Noveske 6.8 barrel is marked for caliber, and the twist clearly indicates that it is the SPC II chambering.

The R16-68 Recon, at 7.4 pounds empty, has a decided thump in recoil. The Vltor Modstock, with its checkered plastic face, offers a wide area but doesn't do much to dampen felt recoil. However, you can't get something for nothing, and the delivered energy, and the accuracy, are worth the shoulder hit. Magazines are now pretty easy to come by, so if you wanted a 6.8 rifle, you should not hesitate. Me, I need another AR like I

need a hole in the head, but this one is very tempting. Accuracy at this level should not be dismissed lightly. Given the cost of 6.8 ammo, I think I'm going to see just how much work it is to reload my own. If that works, Noveske isn't getting this one back.

But if I do send it back, someone somewhere is going to get a primo 6.8 off the "slightly used" rack.

THE DPMS 6.8

CHAPTER 22



Clearly marked, and standard in all respects, the DPMS 6.8 is a good value-for-money rifle.



The DPMS 6.8 M4 clone is a very nice, albeit basic rifle. But basic is good, if you plan on changing things yourself.

The DPMS AP468 is one of their Panther series, done up in 6.8 Remington SPC, and in this instance dolled up to be as much of an M4gery as possible. Starting with forged uppers and lowers, DPMS machines them to mil-spec, and has them hard-coat mil-spec anodized. That isn't enough for them, so the 7075-T6 receivers are then Teflon coated to a gloss black for extra durability.

The barrel is an M4 profile, 16 inches and a fraction long with an A2 flash hider. (6.8 barrels have a different thread pitch for the flash hider than 5.56 barrels do, so you can't put the too-small 5.56 on a 6.8.) The 4140 steel barrel is button-rifled to a 1:11 twist, and the chamber is cut to the 6.8X43 Remington SPC II dimensions, so you'll have the latest in accurate and reliable 6.8 delivery systems.

The barrel is parkerized, and the forged front sight

housing is pinned in place, all according to mil-spec. on top, it uses the DI gas system, with a plain old gas tube running back into the receiver, where it mates up with the standard 8620 steel carrier and mil-spec bolt (except, obviously for the bolt face, it's opened to accept the 6.8 rim) with a standard carbine buffer and spring behind them.

The stock is pure M4, and the sights are the detachable carry handle that was all the rage in the 1990s and now seems just a little bit quaint. But they work just fine, and if you aren't wedded to optics, there is no need to turn them down. Indeed, you can't, it is about as durable an iron sight setup as the AR has.

The upper is an A3 flat-top, with the forward assist and ejector lump we all know and love, and the lower is a standard small-pin lower, marked "fire" and "safe."



DPMS 6.8MM 1-11

The barrel is marked, and clearly the 1:11 twist means it has an SPC II chambering, a good thing.

Indeed, the whole point of the 6.8 is that very little has to be changed in order to accommodate it. The handguards appear to be standard M4 “taller than they are wide” handguards, with double heatshields. However, they are better; they are DPMS GlacierGuards. Instead of sheet metal to reflect the heat back, the DPMS handguards are heavy polymer with thick ribs on the insides. The polymer absorbs the heat, but the greater surface area inside re-radiates it internally, and doesn’t transmit the heat to your hands. They serve two purposes: they protect your hands from the heat, and the beefier construction makes the GlacierGuards tougher than standard M4 handguards.

The standard trigger for the AP4 line is mil-spec semi-auto parts, hammer, trigger and disconnect. On this one, the crew at DPMS installed one of their two-stage triggers. The resulting trigger pull is very nice indeed. With a springy and clean take-up of a couple of pounds, and then a crisp and clean release for another couple of pounds, the trigger pull is very classic, and unless you’ve been raised on M1 Garands and M14/M1A rifles, it may be something you’ll have to dry fire a bit to get used to.

For drills I left the carry handle on and used the iron sights, which worked just fine for fast and tactical 100 yards and on in. The trigger is very useful in doing well. For accuracy, I took the carry handle off and mounted a Leupold 30mm Mark 4 scope in a LaRue quick-detach



The carrier is properly staked. We’re seeing more and more companies do it right, but DPMS always has.



The front sight housing. Gas block is forged, pinned on and mil-spec.

mount. While the scope and trigger made the work easy, and the ammo was up to snuff, the light weight of the rifle made it more like work than a pleasant afternoon punching paper. With the DPMS at seven pounds even without extras, the hard checkered plastic buttplate of the M4 stock works hard to sand off the skin under a shirt. The extra recoil of the 6.8 adds to that. As handy as a seven-pound rifle is, it is just a bit light for a 6.8, for my tastes, anyway (thus proving that you can, indeed, have too much of a good thing). But, you can always add weight a lot more easily than you can remove it. A portly rifle makes it difficult to lighten, but extra gear bolted onto a lightweight rifle works to dampen the recoil of a 6.8.

The rifle wanted to shoot MOA, and to my mind it is an MOA rifle. Take the GlacierGuard handguards off and replace them with a railed free-float handguard, and swap the M4 stock for something a bit more comfy like a Magpul or Vltor, and you’d have an eight-pound rifle. Mount a scope, and add a light, and you can easily get



DPMS makes all kinds of rifles: select-fire, SBRs, many calibers. Despite the brass in the air, this isn't a select-fire SBR. I'm just that fast and heavy on the trigger.

it up to the nine-pound weight class, and once there the rifle isn't going to be shoving you around anymore. I'd bet the trigger will let you shoot very nice, even sub-MOA groups.

If, however, you aren't worried about shooting one-hole groups and want a thumping good defensive rifle, one capable of shooting well under minute-of-felon, then this one should be high on your list. It comes in a hard case, with cleaning kit and two 25-round magazines and sling. And when you consider that you can acquire a DPMS 6.8 rifle for about half of what other 6.8s are going for, it becomes a lot more attractive. Sure, some of that bargain price will be used up on the free-float handguard you "have to have" and a few other items. But they'll be the items you want, not the package deal of the manufacturer. And you'll still have a lot of money left for practice ammo and magazines, things that are always useful.

It really isn't a matter of "should you," anyway. You know you want it, and your buddies at the gun club will all be envious. And, if you do ever need to call on it for defense, the DPMS Panther is not going to let you down.



If your state DNR doesn't allow .223 for these little beasties, then the DPMS 6.8 is just what you need.

THE ROCK RIVER OPERATOR

CHAPTER 23



The Rock River Operator, in this instance the Elite Operator, was named by yours truly. And a couple of other writers, too.



The Operator stock, a solid, comfortable tele-stock with storage.

OK, I have to ‘fess up on this one. The ads you’ve been seeing for the Rock River Arms Operator series? That’s due to me. Well, due to me and a couple other of my gun writer compatriots. You see, at an industry gathering where Rock River was showing us the parts and pieces that would go into the new series of rifles, they came up with an idea: name the gun. So, we dutifully took the forms, scrawled our names on them, and jotted down a few ideas for names. I have to confess I wasn’t really in the naming frame of mind. Perhaps I’d had too much coffee. Or perhaps I was just itching to get out to the range and actually, you know, shoot guns. I put down all the tongue-in-cheek names I could think of, along with a few obvious satirical ones (there’s a reason some PR people groan when I walk into a room) and to

finish it off I added a few that might actually be useful. I’m surprised they didn’t just toss my list when they saw my name.

And yes, being a gun writer can be (but isn’t always) just as much fun as you think it is.

You guessed it; Operator was one of the last ones I scribbled down. Now, I can’t take full credit for this, as two other writers came up with the same name. Soon afterwards we had rifles to inspect and test. I opted to test the top of the line model, the Elite Operator. The other two are the Entry Operator and the Tactical Operator.

Rock River Arms is located on the western edge of Illinois, right near the Quad Cities area, a location known for its manufacturing capacity in times past, and



The Elite Operator forearm, an aluminum tube with integral rails on the front portion.



The buttplate slides down to uncover the storage compartments.



The storage caps are large and have rubber o-rings, and you can really get a grip on them.

when rational people ran the country the region was well-thought of as a cradle of manufacturing and arms industry. Rock River also used to make semi-custom and custom 1911s, but when the AR-15 market exploded they set aside all the 1911 tools to concentrate on the product of the age: the AR-15. I had a chance to visit them just as they were transitioning to making just ARs, and it was sad to see the last of the 1911s being worked on, knowing there would be not more for a while.



The Operators come with mil-spec side sling mounts, a very useful thing to have.

The Elite Operator (or to give it its full title: the RRA LAR-15 Elite Operator) is a tele-stocked carbine in 5.56. The stock is a close-appearing copy of the mondo-expensive SOPMOD stock that your tax dollars buy by the truckload. At more than \$100 less in cost than the USGI SOPMOD stock (and a complete assembly, at that) the Rock River stock is more than just a good deal. It has six positions, and instead of the two battery compartments being opened on the front, with an o-ring to keep them sealed, the two compartments on the Operator stock are hidden. First, you use the push button to unlatch the buttplate, and slide it down, then you pry the two o-ring sealed covers off. They are large enough to grasp, and thus you can really shove them in for a good seal. As a bonus, if you lose the o-ring covers, the buttplate will still keep your stuff in the tubes, albeit without the waterproof seal.

The stock is well-shaped to provide a good cheekrest, and it slides back and forth smoothly and clocks solidly in place. Plus it doesn't rattle or wobble.

The Operator series also come with an ERGOgrip, a rubber pistol grip that replicates the shape of the MP5 grip. A lot of people like it. As with a lot of the options on an AR, it can be a very personal thing. When I first saw them, I started out liking the ERGOgrip but have come to find it not suited to my shooting style. If it works



The Rock River barrels are noted for accuracy. This one is 5.56 chambered with a 1:9 twist.



The muzzle brake, something I will test but probably swap out. I've found that shooters on the line with you really dislike being pummeled by your muzzle blast.

for you, good – get it or keep it. If not, it is easy enough to change. A lot of rifles come with this grip, so I have to assume that a lot of you like it.

All the Operator series come with a 5.56 chamber, a forged A4 upper, a 16-inch chrome-moly steel barrel, chrome plated, with a twist of 1:9. The barrel is capped with an RRA tactical muzzle brake, an item I find useful on a competition range but much less so for defensive use. Especially in any kind of teamwork, a muzzle brake makes your shooting easier by dumping hot gases to the side, where your teammate may well be. But muzzle devices are easy enough to change, and if I don't get too many complaints from the guys on the line at the next LEO class, I might leave it on for a while.



The Rock River acorn-shaped safety. A nice, useable safety, but the ambi versions crowd my trigger finger.

They also all come with the RRA Star safety, an ambi safety that has a raised, acorn-shaped knob on it. I'm going to have to take the grinder to the right-side acorn, as it rides right underneath my trigger finger. Now, this is not just a personal matter, but a very peculiar quirk of my shooting style. I choke up with my shooting hand very high on a pistol grip. So high that my trigger finger is actually coming down to the trigger on an AR. As a result, I find most ambi safeties on an AR, regardless of the design, to be problematic. This is no slam against Rock River, and in fact their design is less objectionable to my hand than many others. You may not have a problem, and in fact, a lot of the officers in our classes really, really like the Rock River design.

Inside the Operator series is the Rock River two-stage trigger. As a competition trigger, it is great. As a duty trigger, especially if your sidearm happens to have a heavier, longer trigger pull, then the mis-match can be a source of friction. As I spend a lot of time with heavier, mil-spec triggers, I'll probably get inside and actually increase the trigger pull of the operator, just so it is more like the sidearm I'll have on.

Last up, but very important, they all have the current USGI front sidemount sling swivel, attached between the legs of the front sight assembly. All three have a fixed, normal front sight tower.



The Operator comes with the Ergo grip. If you like it, great. My odd, non-standard grip makes it not so useful.

They all come in a case, with two magazines, manual, and warranty.

The Elite Operator differs from the other two in having a special handguard; the Entry and Tactical have M4-type plastic handguards. (The Entry and Tactical differ from each other in the barrel; the Entry has an M4-style profile, while the tactical has a lighter barrel, shaving a bit over half a pound from the full-up weight.) The Elite handguard is a free-floated aluminum handguard with rails on the cardinal points, but rails that are only half the length of the handguard. Most users don't need rails that go all the way back, so why make them that way?

As a final lagniappe, Rock River knows that what the end-user needs are options and extras. So when the Operators rolled out, they came with some very nice extras. You could have your choice of one-inch or 30mm



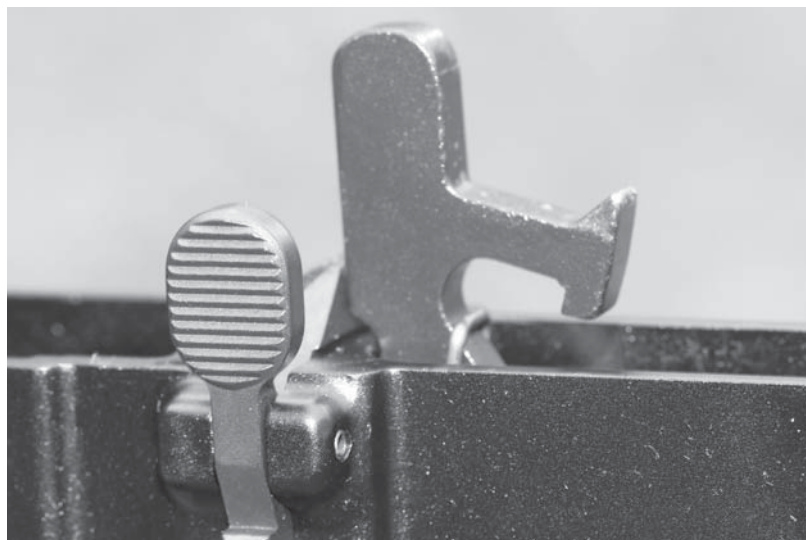
The Rock River BUIS, with integral rail for mounting a red-dot sight.

scope rings, a one-piece unit that clamps right onto the top rail of the receiver. And you got to pick from four different BUIS/handle setups, from a regular A2 handle and sight to the RRA tactical handle, the Dominator2 that allows you to put a red-dot on the removable rail/BUIS, and a plain old RRA standalone sight that would be an entirely serviceable sight all on its own.

Now, the bonus items may well have been changed, dropped or modified by the time you get this book, so don't go hounding Rock River for the extras that "Sweeney promised me."

How does it shoot? Nice would be a word to use. Accurate would be another. An eight-pound (before sights and ammo) AR carbine in 5.56 doesn't exactly smack you in the chops every time it goes off, and the muzzle brake does a lot to remove what little steam there might be in the recoil. The trigger is clean and crisp, and has a short re-set (for those who care about re-set), so shooting quick pairs or follow-up shots is no problem at all. As with all aluminum handguards, if you shoot a lot, quickly, you're going to heat up the handguard. So it would be best (if you're a "heavy on the trigger" shooter) to have a set of nomex gloves in your shooting gear, just in case.

Also, the black aluminum will absorb heat from the sun, so if you live in a desert or desert-like area, you'll want to be careful picking it out of the rack. But that is not a feature unique to the Elite Operator; all aluminum-handguard rifles have that predicament.



The Operators come with Rock River two-stage match triggers. Great for precise shooting, but if you carry a striker-fired 9mm sidearm, be careful of transitions.

The 1:9 twist is plenty good enough for all bullets up to 68 grains, and like the rest, it may or may not like a particular 75- or 77-grain load. Only testing will tell, and I'm not worried. It isn't like I have a garage full of cartons of Mk262 Mod 1 ammo. It shoots just fine with M855 green tip, so I'm set.

If you like the RRA half-quad aluminum free-floated handguard (that's what it is called, off of the Elite) you can get one from Rock River. It is a standard stocking item, and they'd be pleased as punch to send you one. You can even get it with the top rail full-length, just in case you want to mount something that can't or won't fit onto just a partial upper rail.

The shipping box is a real bonus. A hard case with latches on three sides (hinge on the other), it takes the rifle in its assembled form. You can have it in the case, ready to go (well, not loaded, that would be stupid) and won't have to slap the two halves together once you've opened the case. While it might not survive being run over by a vehicle (and then again, it might) the case will certainly protect your Rock River Operator from normal abuse: dropping, falling off benches, getting kicked across the room by your clumsy buddies, etc.

Did I send this one back? Are you crazy? After all, I named the thing. Now go out there and buy one for yourself, so Rock River thinks I actually knew what I was doing.

WILSON COMBAT 6.8

CHAPTER 24



One of the Wilson 6.8 rifles, here with an Aimpoint M4 on it. You'll note that the Wilson BUIS doesn't crowd the Aimpoint, and when it flips up the Wilson BUIS won't bang the M4.



The folding Wilson front sight, which blends in nicely with the top rail of the free-float Wilson handguard.

If you spend any time at all in a competitive endeavor, you'll quickly realize that skill at any given contest does not necessarily carry over to another. The list of professional ballplayers (football, baseball, whatever) who were good on the field, and then good as a coach, is small. The list of professional sports figures who go on to open successful businesses is small, indeed.

Skill in any endeavor is a rare thing. We should expect, therefore, that skill in two would be rarer still. Which is one of the things that makes Bill Wilson rare. Were I given to the usual sloppy hyperbole that modern writing schools seem to encourage so much, I'd call him unique. He isn't. As good as he is, he isn't the only one to be successful as a businessman in the field in which he saw such fame as a competitor. And make no mistake, he was a heavyweight back in the early days of IPSC, and he's a heavyweight now in the field of custom guns.

Starting with 1911s, Bill has expanded to the modern triumvirate of defensive artillery: the 1911, the 870, and the AR. Wilson ARs are built on 7075-T6 forgings, precision machined (and in this day and age that means CNC multi-axis machines) and hard-coat anodized. The receivers are then given a Wilson Armor-Tuff® baked-on epoxy finish, in your choice of green, black, tan, gray or stainless, depending on the model. They all have Wilson match-grade barrels, 16, 18 or 20 inches, depending on what model you choose. The smallbores have 5.56 chambers for reliable chambering and to avoid the problems that .223 chambers can bring when fed a diet of 5.56-spec ammo.

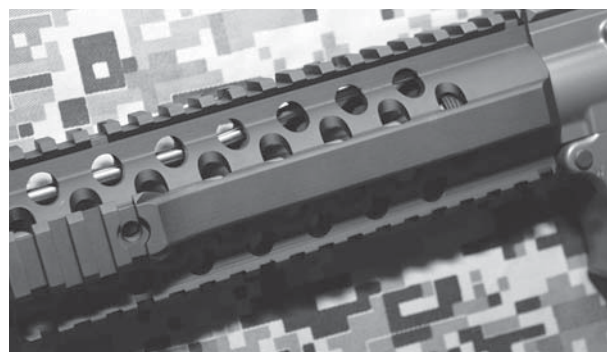
As with his 1911s, you can get a standard, Wilson-spec rifle: just pick the catalog number, phone or email your order, and your FFL will be receiving it in short order. Or you can custom-build the AR of your heart's



Upright, the Wilson front sight is sturdy and provides a solid sight picture.



The Wilson BUIS is spring-loaded. Press the lock button and it pops up on its own.



The Wilson handguard, with the rear rails shaved off. It proves a less “bite-y” gripping surface and also gives you an oval to index the rifle vertically.

desire by starting with a Wilson model and substituting items such as flash hiders (Vortex, A2 or Wilson Tactical Muzzle brake?), stocks (Magpul or M4?), folding sights (Wilson makes a handful, front and rear), and your choice of railed handguard – and do you want low-profile rail ladders, or full-profile rail covers?

Scope mounts, optics, pistol grips, charging handles, bolt releases, foregrips, all can be spec'd and either left as-is or Armor-Tuff® coated to match.

But you knew all that, right? I mean, you're an AR fan who stays in the know, so none of that is news to you. Well, guess again; Wilson is now making rifles in 6.8.

Developed to provide a significant increase in terminal effectiveness without making recoil onerous, the 6.8 Remington SPC is a big step up. If you want a rifle chambered in a cartridge a lot more suited to hunting (and it will pass muster even in States where he DNR does not allow .223/5.56 for deer hunting) while

being the modern, reliable, and accurate rifle of the 21st century, the 6.8 is a good choice. The Wilson 6.8 project simply takes the already-excellent Wilson AR and replaces the 5.56 parts with 6.8.

The barrel is a stainless medium weight match grade barrel with a 1:11 twist and an SPC II chamber. That means you have the pressure-lowering benefits of the new throat and leade and the accuracy of a match barrel but the relatively slow twist to increase bullet instability on impact. The gas system is mid-length, for a lower port pressure and less abrupt gas flow, while still maintaining a length-enough gas dwell time for reliable function. You have a choice of 16- or 18-inch barrels, and the railed forearm is appropriately proportioned for each. The match barrel is guaranteed to deliver MOA accuracy with match-grade ammo.

The new Wilson Combat Quadrail is interesting. It is fully-railed on top, but on the side the rails are



The Wilson carrier is smartly and properly staked.

carved off just forward of the midpoint. That gives you a slimmer, more oval shape, and one that doesn't have rails to gnaw at your hands. But the forward sections of rail provide plenty of space to mount lights, lasers, and other tactical goodies.

The trigger is the Wilson single stage TTU for a clean and crisp letoff, but one that feels like any other AR trigger, just a lot nicer. If you opt for a complete rifle, you get Magpul stock and pistol grip. If, however, you already have an AR (let us hope it is a Wilson, so the upper won't feel lonely) then you can simply acquire a Wilson 6.8 upper to put on your existing lower.

Now, if you want to shave half a pound off your full-up weight, then the Wilson Tactical Hunter Lightweight 6.8 SPC will do that. With a 16-inch barrel of a slightly slimmer profile, the Tactical Hunter becomes a very light, handy, mid-power hunting rifle, and one with guaranteed MOA accuracy.

But wait, we're not done yet. Options! You get options.

You can replace the single-stage TTU with the two-stage TTU and get a target/competition trigger pull in your rifle. The single stage is 3.5 pounds, the double is 3, but the difference is greater than that. On a single-stage trigger, you press on the trigger, and when you reach the break point, 3.5 pounds, the trigger moves and the hammer falls. On a two-stage trigger, you take up a pound and a half of slack, and then another pound and a half releases the hammer. If you decide not to shoot, letting go of the trigger relaxes that pound and a half of take-up you started.

You can also opt for a Wilson oversized bolt stop, if you're using it in competition. You have your choice of a fixed or folding front sight, and two different folding rear sights, as well as an A2 detachable carry handle rear.

Scope rings: you get a choice of one-inch or 30mm, and they fit over the folding Wilson rear sights.



The LMT-manufactured bolt, combined with the SPC II chamber, means many years of trouble-free 6.8 shooting lie ahead.



The other Wilson 6.8 that arrived had a Trijicon scope on it, to take advantage of the long-range capabilities of the 6.8 cartridge. Too bad my home range is only good out to 100 yards.

Or you can simply build your Wilson 6.8 as an M4 clone.

If you want to do the work yourself, Bill is more than happy to accommodate you. You can order up a 6.8 barrel, in one of six length/profile/fluted or unfluted combinations, and a bolt and carrier combo made for Wilson by LMT, complete with NP3 plating. Magazines, ammo, flash hiders, and case gauges for the reloaders are all available from Bill. As I said, he's a really good businessman.

The two things that jumped out at me when I had a chance to handle and shoot the Wilson 6.8 were the handguards and the front sight. The new FUFs is a sleek and clean folded sight that locks in either the up or down position. When it is folded, it is not just unobtrusive, it is almost hidden. And when it is up, it is locked there. The button to unlock it is guarded, so it is highly unlikely that you will accidentally brush the button and partially fold your front sight.

If you are wedded to sights on the rail, Wilson also offers a folding front sight that fits there, too.

The Combat Quadrail has full-length top and bottom rails, but the side rails are sculpted on the rear two-thirds or so. This gives you a firm hold without the "bite" of rails on the sides. It also give you a better index on the front hand, so you know if the rifle is vertical as it comes up, and you don't have to hunt for the sights once you've shouldered it. As a bonus, there are eight threaded holes (1/4"X20) where you can bolt on something that needs more than just a rail or that can be bolted on and take up less space than a quick detach system requires.



The Wilson 6.8, empty but with scope, tips the scales at 7-3/4 pounds. There are common deer rifles that weigh a lot more than that. Get out and hunt with your Wilson.

Made from 6065 T5 and hard anodized, you're going to have to work to wear this one out.

How did they shoot? Do you really have to ask that? With a Trijicon 3-9 on one Tactical Custom and an Aimpoint M4 on the other, the results were as expected: lots of easy fast, close-range hosing on drills, and nice, even, small clusters on the 100-yard targets. The Wilson triggers made shooting a breeze, and the rifles ran flawlessly.

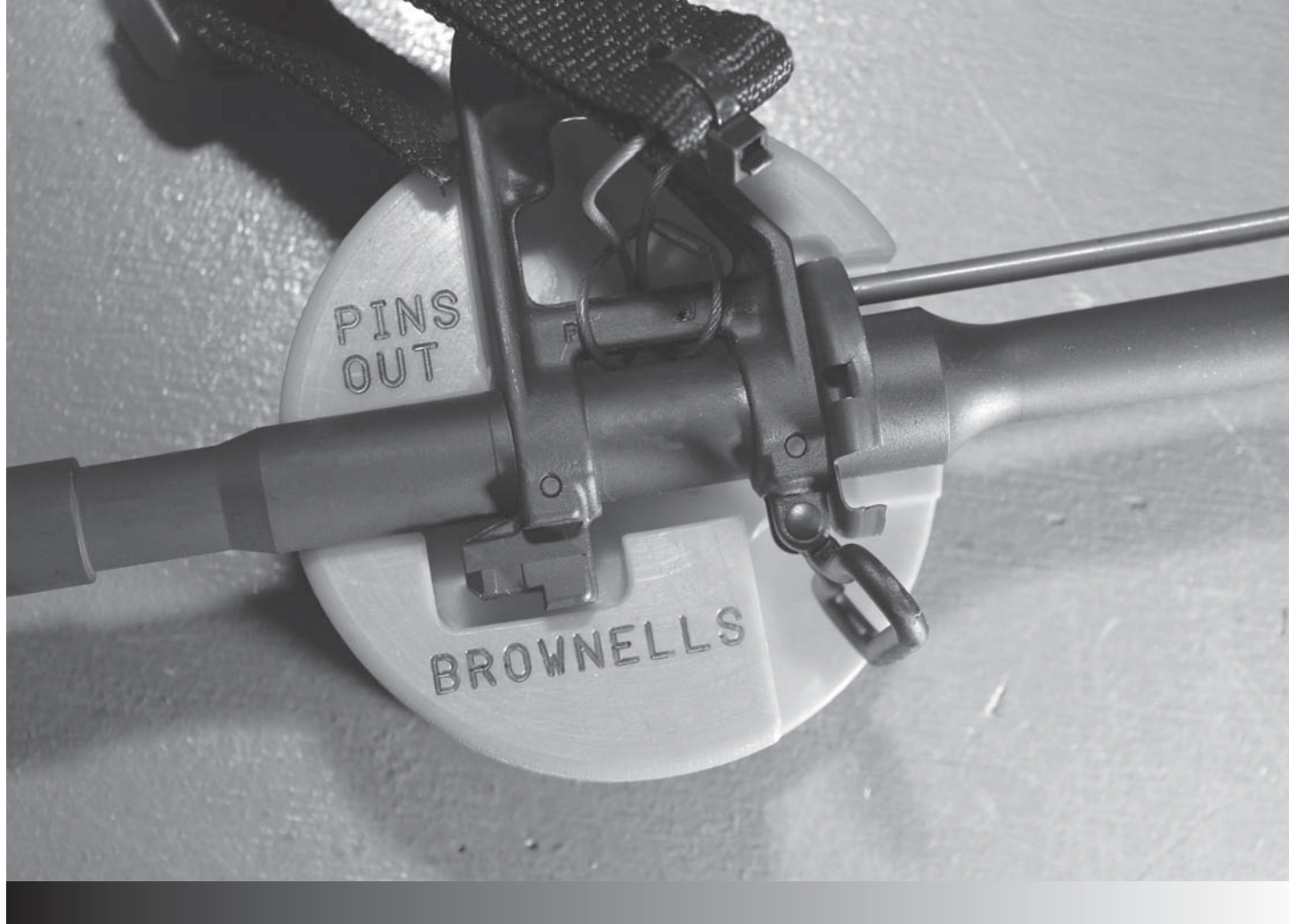
You really do owe it to yourself to shoot a Wilson. You won't be disappointed.

ONE RIFLE TO RULE THEM ALL

CHAPTER 25



The starting point: my custom-built Rock River M4 clone, which is a dependable and tack-driving DI-driven 5.56.



First thing; drive out the old pin, and remove the gas tube.

Up until now, we've been discussing the AR as a single, stand-alone rifle. Here, we'll take a base rifle and see just how much we can change it and add to it in the process.

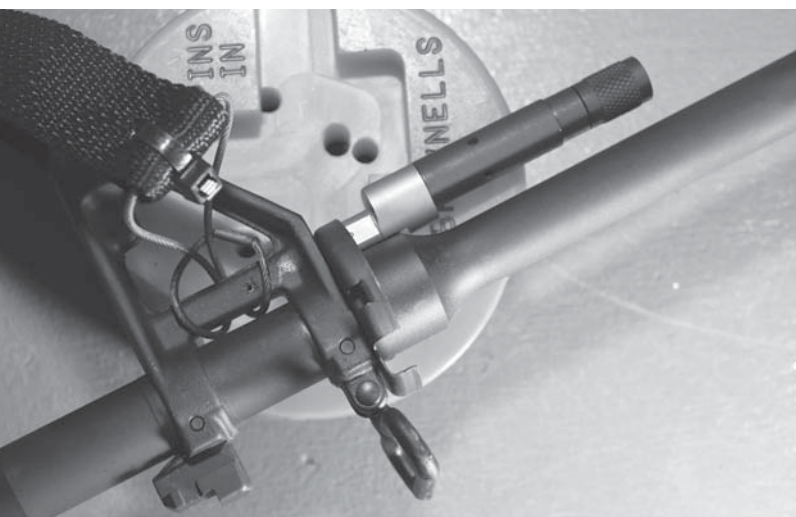
The base gun is one I custom-ordered from Rock River a while back. It is the lightest M4gery they make. The barrel is not as slim as I might have liked, but Rock River feels that it is as slender as they can make it and still maintain their jealously-guarded reputation for accuracy. It has an oversized trigger guard, and everything else on it is pretty much your standard M4 clone. As a flat-top, it is easy to mount optics, and in initial testing I did that, just to make sure it was accurate. It was and still is. Now, let's see what we can do.

First up, we'll change the existing operation to a piston system. For this I selected the Ares system, as

it works with the front sight tower as-is. If I wanted to replace the front sight tower I would likely go with an Adams Arms or the CMMG system, but I wanted to make the change with as little work as possible.

The Ares conversion is simple: a conversion carrier, with a thrust shoulder machined into it; handguards with a slot cut to clear the system; and the spigot/gas cylinder, piston, connecting link, op-rod and return spring, and guide bushing. So, I took the Rock River rifle, opened it up and removed the bolt and carrier. Removed the handguards, drove out the gas tube retaining pin and wrestled the gas tube out. So far, not much more than a basic strip and clean after a day's shooting.

Then I scrubbed the gas tube clearance recess above the chamber. If you have a rifle that has seen years of shooting, and thousands of rounds, this might take some



Then, install the Ares front piston block.



Then, remove the bolt from the old carrier and install it in the replacement carrier.



Insert the rod guide in the upper, after you scrub and scrape the carbon out.



The AR57 conversion upper, with a P90 magazine. Fifty rounds of 5.7X28 ammo, at your disposal.

work. As the Rock River was relatively new, it was no big deal to scrub it clean.

I then inserted the bushing, tapered end first. If I had needed to, I could have used the op-rod as a guide by inserting it from the rear and using the head of the rod as a gentle slam-hammer to get the bushing in and straight. I'd then remove the op-rod.

Then I took the spigot and inserted it into the gas tube hole in the front sight, lining it up with the roll pin hole (note that the spigot goes up from the barrel, not down towards it) and driving in a new roll pin. The spigot is going to have a lot more going on than the gas tube did. I wasn't going to be cheap and try to re-use a tired old roll pin.

I then took the op rod and pressed its return spring over it and threaded it down into the receiver. I placed the connecting link over it and put the piston in-between the connecting link and the spigot. I slowly let the return spring push the connector link to the piston, and all into the spigot. I oiled the system and checked function by gently pressing things back and seeing that the spring returned them forward without binding. If it had bound up, I'd have known that something is out of alignment.

I took the old bolt out of the carrier and removed the gas rings. I knew I wouldn't need them, and neither will you. I then reassembled the bolt in the new carrier and reassembled the rifle, checking mechanical function by



The starting point of the big-bore: the barrel, handguard and upper receiver.

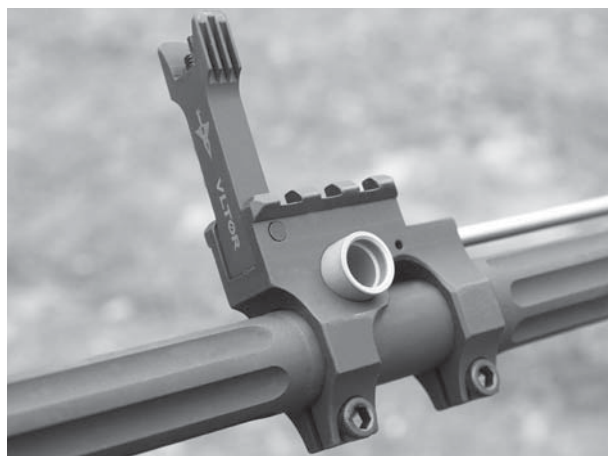
cycling the bolt and watching the carrier and piston. Once I was sure it was working as intended, I installed the new handguards, the one with the black liner goes on the bottom.

To check function, I did what I'd do with any newly-built rifle: loaded one round and fired (at the range) to see that the bolt locked back. If it didn't, I'd have known that something was binding and inspected, found and corrected the problem. It locked back just fine, though, so I re-loaded three rounds in the mag and test fired.

I was good to go.

You (me) now have a piston-driven rifle or carbine, and the work took about fifteen minutes, including scraping the carbon out of the gas tube recess in the receiver. The change in accuracy was nil.

Now, let's get into the interesting parts. The AR is fine, but for some even the minimal recoil is a bit much. How to get something useful, not .22 LR, and still have an AR? Simple: convert it to shoot the FN 5.7X28 cartridge. Developed for the P90, PS90 and the FiveseveN pistol, the 5.7 is a self-loading equivalent to the .22 Hornet. Not that the tactical types like that comparison, but there it is: it shoots a .224-inch bullet in the light end of such bullets, right around 2,000 fps. Handguns, less; rifles, more. Now, a 40-grain .224 bullet at 1700 or 2100 fps is not exactly the hammer of Thor. But then again, the recoil is so inconsequential, no



The Vltor front sight, with sling socket, installed on the Sabre Defence barrel.

negligible, that it really isn't there. The noise is a bigger problem than the recoil, and it isn't very noisy.

You are not, however, going to escape so easily as with the Ares conversion. You can't just swap bolts or gas systems; you have to start with a whole new barrel. And since one of the big attributes of the P90 and PS90 is the 50-round magazine, you'd be giving that up if you tried to make your regular AR mags feed 5.7X28. (And fail miserably, too. They are so radically different in size, you just can't do it.) So, you swap uppers.

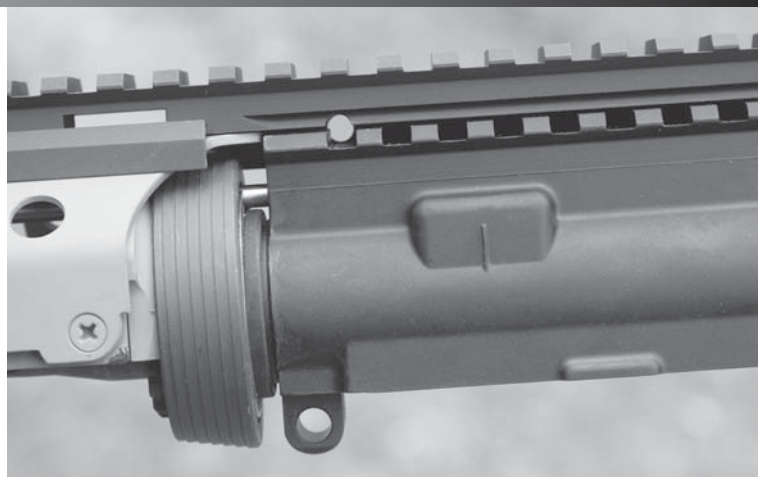


The Vltor CASV-MT handguards simply clip onto the barrel nut.

The AR57 is a complete upper: barrel, receiver, bolt and replacement buffer. It's a cool piece of gear. Starting with 7076 T6 forgings, they machine the receiver, install Picatinny rails, a 4140 steel barrel, chambered for 5.7X28 and with a rifling twist of 1:8.5. The muzzle is threaded for the standard AR thread pitch of 1/2X28, so you can install any kind of AR flash hider or muzzle brake you want, not that you'll need either with the 5.7. The case is small, and the expansion ratio (the volume of the bore, compared to the volume of the case) is so great that I'd be massively surprised if you needed a flash hider at all.

The bolt is another 4140 steel part, machined and parkerized.

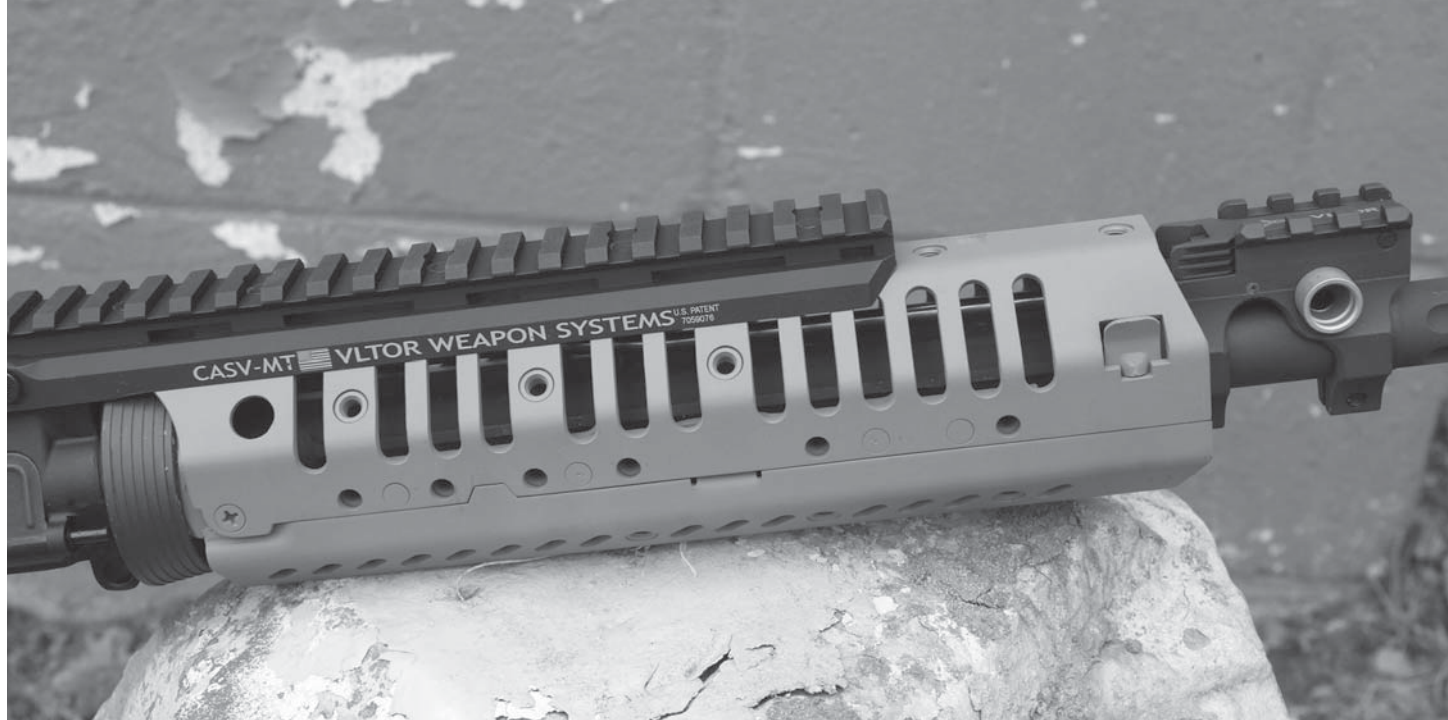
The buffer is special for the 5.7, and you simply remove yours and replace it with the relevant AR57 buffer.



Once lined up, you insert the clamping screws through the rails and lock the CASV-MT upper rail to the flat-top receiver.



Ready for zeroing the irons, and installing optics for some shooting.



The CASV series of handguards are free-floated, lightweight, have removable bottom halves, and look cool as all get-out.

The FN magazines ride on top, just as they do on the P90 and PS90. Slide the square end under the front lip, pivot it down to the chamber, and slap it in place. The magazine catch is on the upper part of the receiver rear. Slide it back, and the magazine pops free. Work the charging handle, and you're ready to go. The empties eject out the bottom, down through the magazine well.

Recoil is nothing, noise is not much (although you'll still need hearing protection, unless you live in a state where a suppressor is kosher, and then you're almost silent), and the fun is off the scale.

Now, nothing in life is free. The conversion upper runs just under \$700 as of this writing. You'll have to invest in FN P90 magazines, which are not as inexpensive as USGI aluminum 5.56 or Magpul PMags. But those don't hold 50 rounds as the FN does. And since it is a full-length (16-inch) barrel and receiver, you are not shaving any weight off. You're probably adding a bit more, unless you run a really portly 5.56 upper. As of this time, 5.7 ammo is as expensive as any other, so it isn't like you're running a .22 LR conversion and gaining the savings in ammo costs.

But boy is it fun! And, the 16-inch barrel of the AR57 gives you the full advantage of the 5.7 ballistics, with a 40-grain bullet at 2,100 fps and the lead-free SS195 with its 28-grain bullet zipping along at a shade over 2,500 fps.

Now, lest you think that we're neglecting it, no, we cannot piston-equip the AR57. The system, just like the FN P90 and PS90, works by blowback. No need for a rod, it works on its own.

For our next step, let's go to the other extreme: just how much horsepower can we wrestle into another upper, one that fits on this rifle, and feeds from magazines in the same magazine well? That leaves out anything .308-based, and we're down to 6.8 or 6.5. Since I already have a couple of 6.8s, I'll opt for building a 6.5. Off to Sabre Defence we go. They recently received a contract to produce M16A3 and M16A4s for the government. No, not internet rumor, not "a guy I know who knows someone who works..." but from personally eyeballing and photographing a Sabre-made rifle with US Government markings on it. In the AR world, where "everyone knows" that only Colt and FN make rifles for the troops, that is a big step up, indeed.

But as interesting as it is, it is tangential to our quest: the multi-caliber AR. So, I settled on a mid-length gas system 18-inch barrel in 6.5, fluted and made of chrome-moly vanadium steel, Mil-B-11595. It is mil-spec manganese phosphate finished and chrome lined. Sabre sent it with their folding front sight and Gill brake on it. Complete with headspaced bolt, it is ready to go into an upper. Well, ready for others, but not me. First, the brake had to go. Mas Ayoob is a big fan of the Gill brake, and



The results of all this work: three uppers, each of which is accurate, reliable, zeroed and ready to go.



**Before and after:
no change in zero
or in accuracy.**

favors it even for personal defense. Me, I want a plain old flash hider for defense, and if I'm going to use something in competition, I want the biggest, baddest muzzle brake the rules allow. Second, the front sight. The Sabre folder uses four screws, with separate clamping plates. I prefer something a little more stout. I took a Vltor folder, which uses two much larger screws, and pinches the sight to the barrel, and installed that. When Vltor heard about this, they sent one of their flash hidiers along so I wouldn't have to bore and re-tap an A2 flash hider.

They sent the flash hider because they were sending me a forearm, a CASV-MT to be precise. The CASV-MT (let's just call it "MT" for short, OK?) installs very simply: it slides over the existing barrel nut, under the delta ring. The extended top rail then clamps onto the rail on top of the receiver, securing the two together. The forearm does not touch the barrel, and you have the best of all: a free-float rail that is lighter than others. The shell of the MT is stamped aluminum with stiffening supports welded inside. The lower half clips on and is quickly removable.

The folding front sight and the MT mesh perfectly, leaving us with only small details to take care of. One is the gas tube. As a mid-length system, it requires a mid-length tube, which Sabre supplied. Installing it in the Vltor front sight block is easy – and isn't. The gas block is steel, and the hole for the roll pin is minimum size. You'll have to have a deft touch, or be practiced,

to install it without marring things. But once there, it isn't coming out. No piston system? As a mid-length, our options are limited, but for now I preferred to go with the traditional DI system.

The 6.5 bolt goes into the original carrier the Rock River came with (and you thought I'd forgotten about that, hadn't you?) and once the gas tube is aligned, I'm ready to go. The MT top rail stops short of the top rail of the upper, so there's room to install a BUIS. I have a number of selections, and I will spend some time on the range trying them to see what works for me. Until then, it is a simple matter to clamp a scope mount on the rail and get to work.

There you have it: an AR that shoots three calibers, from the lowest recoil to the long-range reach of the 6.5, all on the same lower. Now, they each require different magazines, so if you're building a system like this you might want to have a special range bag for this (or one like it) rifle. In that range bag would go magazines of each type, and you'd stock it with ammo of each type before you headed out. It would royally screwup an otherwise fun day at the range to arrive with a rifle and uppers, to have magazines for "A" caliber, ammo for "B" caliber, and find the only range you can get time on is restricted to "C" ammo, for which you have neither ammo nor mags.

And, as with so many other things in this book, you probably know how I know that.

CONCLUSION

CONCLUSION



When the AR is replaced, it will be after a long and arduous selection process by the Army, a process which will make selecting a new Doge in old Venice seem like a walk in the park.



An array of ARs, most of which are in this book. With such an established base of manufacturers, suppliers, accessory makers and users, the AR is going to be with us for a long, long time.

So, what have we learned from all this? First, that the AR is the first, and if we exclude the Ruger 10/22, the only user-modifiable rifle. That is, you can take one apart, and put one together, and make it pretty much what you want it to be. It can be a .22 rimfire plinker, a .45 caliber thumper, a long-range target/sniper rifle, and a CQB hose-tool.

And you can do this without a specialized set of tools. Tools make the job easier (which is why tools were invented) but for example, replacing a barrel on an AR is nothing at all like replacing the barrel on a Mauser 98, Winchester M70, Remington 700 or (god forbid, don't even think it) Winchester 94. As such, it is an attractive project rifle, and one that supports a huge industry for making and supplying "extras." Just to give you an idea, Brownells, the gunsmithing supply powerhouse,

can supply you with Mauser barrels, Remington 700 barrels, and AR barrels. Not many others. And to install a Mauser or Remmy, you'll need a whole lot more tools, at a bigger bite on your wallet.

That alone means it will be with us for a long time. That it has been the government-issue rifle (in select-fire form) for two generations now is icing on the cake. After all, no one was basement-replacing barrels and changing calibers on Springfields, Garands or M14s during their time as USGI rifles. No, to do that you needed a gunsmith, and one with a lathe and specialized tooling. Like a timing gauge, barrel vise, gas cylinder gauge, the list goes on.

If the consensus becomes that the 5.56 cartridge is just too little for the job, then there will be another entire industry in making replacement barrels in 6.8

Remington SPC, SPCII, 6.5, 6X45, or whatever the selected “better” cartridge is. We’re already seeing that, in that everyone (almost) who makes a 5.56, also makes either a 6.8, a 6.5, or both. If someone invents a wundercartridge, then we’ll all switch to that, as switching is easy, merely a matter of barrel, bolt, maybe magazines. And since barrels and bolts are consumables, things you use up in practice and training, then a new barrel is not a horrible burden.

Remember in the beginning, when I calculated that the M2HB and its wondrous .50 BMG cartridge would have to be in service in 2051 to match the British Brown Bess? Well, I fully expect it to do just that. The Army has been trying to replace it with something “better” for pretty much my whole adult life, without success. While heavy, it is durable, understandable, reliable, and delivers the goods. The attempts to make it lighter have all so far fallen flat on many fronts, but that doesn’t keep the Army from trying. To match the Land Pattern Musket’s longevity, the AR-15 will have to still be in service in the year 2094. Now, I expect to be a very opinionated old gun writer (if there is still gun writing then) when the M2HB matches the musket’s record. (Of course, I’m already well on my way to being opinionated, but give me another 40+ years.) If by that year of 2051 we haven’t found a replacement for the AR-15, I will be sorely disappointed.

After all, that’s plenty of time to find something better than the lousy, fragile, underpowered carbine we’re saddled with, isn’t it? That no-one has come up with something better, and the powers-that-be haven’t adopted it would say an awful lot about us, would it not?

As for the AR-15 matching the Brown Bess, if it does that I’ll be very happy. After all, by then I’ll be 141 years old, and if I’m still around and able to hold an opinion, then medical technology will have made small arms into mere noisemakers.

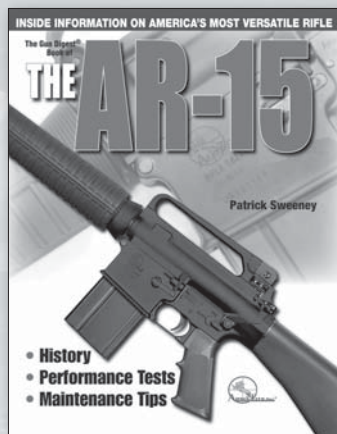
In any case, the AR-15 is going to be around for a long time. Even if the day I hand in this manuscript the Army decides that they want something, anything, else, they will spend another decade deciding exactly what it will be. And a lot of that time will be spent in wrangling over what it should be: CQB, sniper, mid-range, low-recoil, thumper, or some god-awful combination that does everything for everyone. That last part is the only outcome that scares me. Meanwhile, the established base of owners, makers, gunsmiths, accessory makers and gun writers is such that we’ll be talking about and using the AR-15 for decades to come.

Back when I was training in the martial arts, we happened to have a discussion of small arms. As it turned out, the group was well-represented by former Marines, soldiers and other servicemen. At one point, one of the instructors remarked on how everyone in his unit complained bitterly when they were forced to turn in their M14s for M16s. Another instructor remarked, “That’s nothing new. I had men in my unit complain when they had to exchange their Springfields for Garands.” The odds are, whatever the armed forces adopt, even if it is a phased plasma rifle in the 40-watt range, the troops will complain. After all, when the British Army exchanged the Martini-Henry in .577/.450, for the new Lee-Metford, they had complaints from the northwest frontier that the new cartridge wasn’t as good a stopper as the old one.

A far more likely scenario is that the Army will adopt small batches of this or that and fiddle-fart around for another couple of decades, until some senator forces the issue and they adopt a new rifle. (Which will “happen” to be built in that Senator’s state, of course. Just a coincidence, mind you.)

Love it, hate it, the AR is here to stay, at least for our lifetimes. So stop grumbling and learn to use it!

Take a Closer Look at Your Favorite Rifles



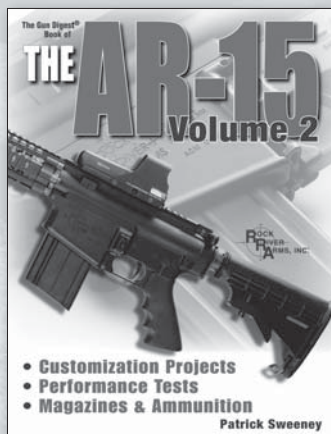
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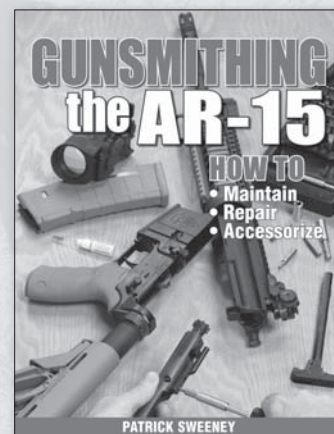
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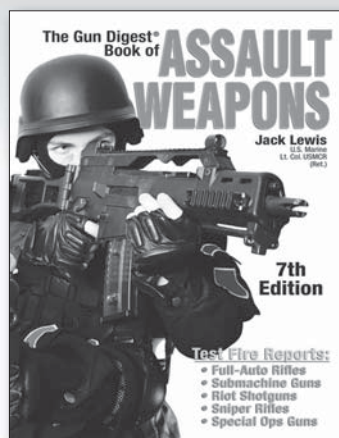
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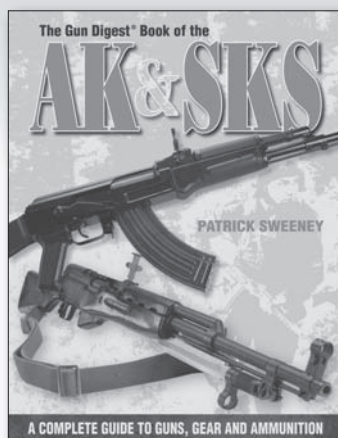
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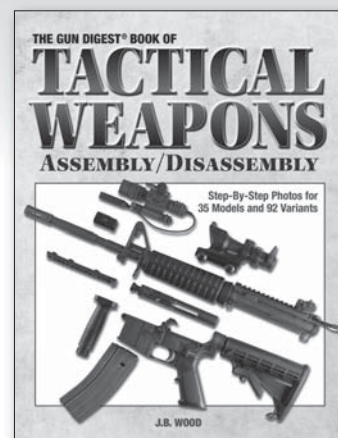
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